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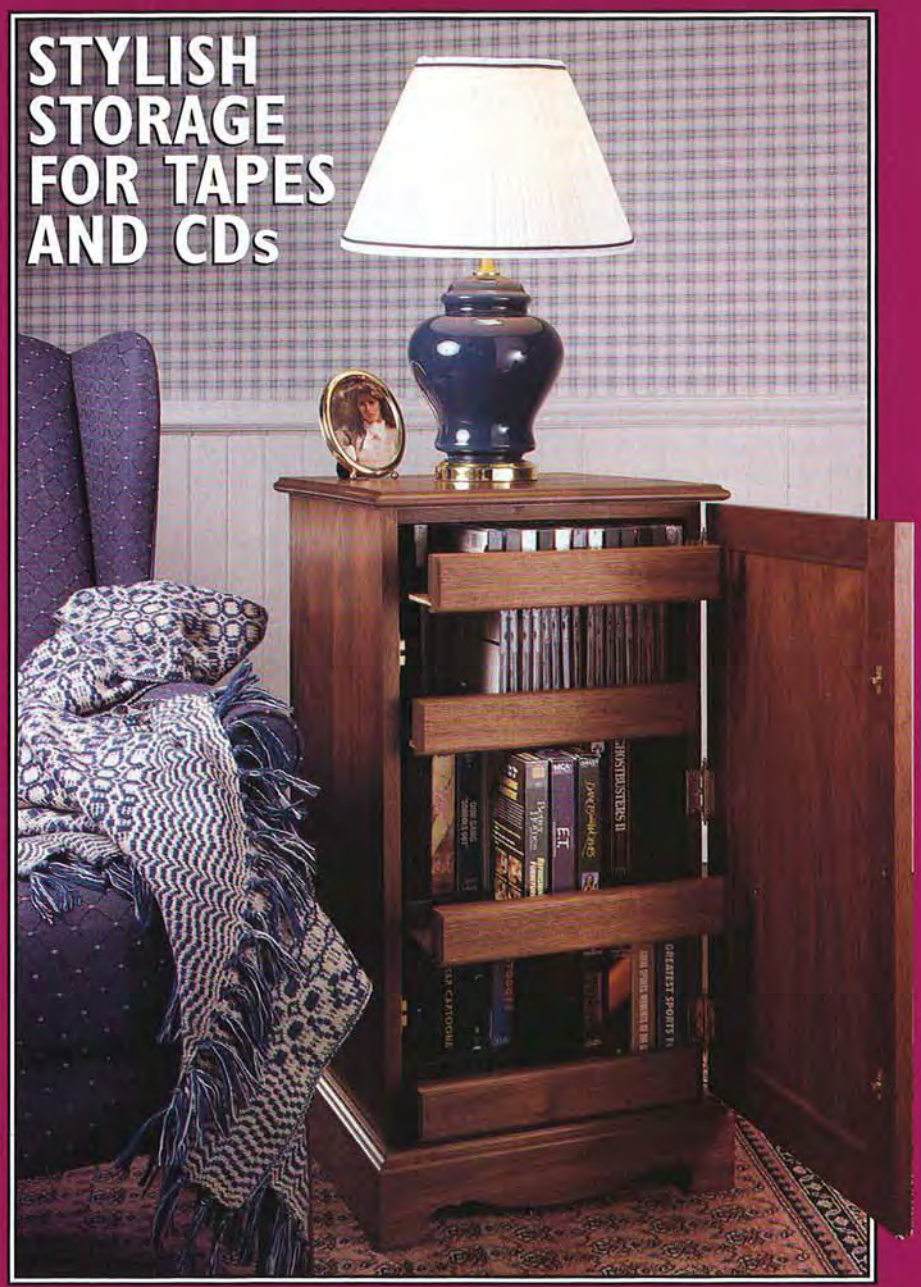

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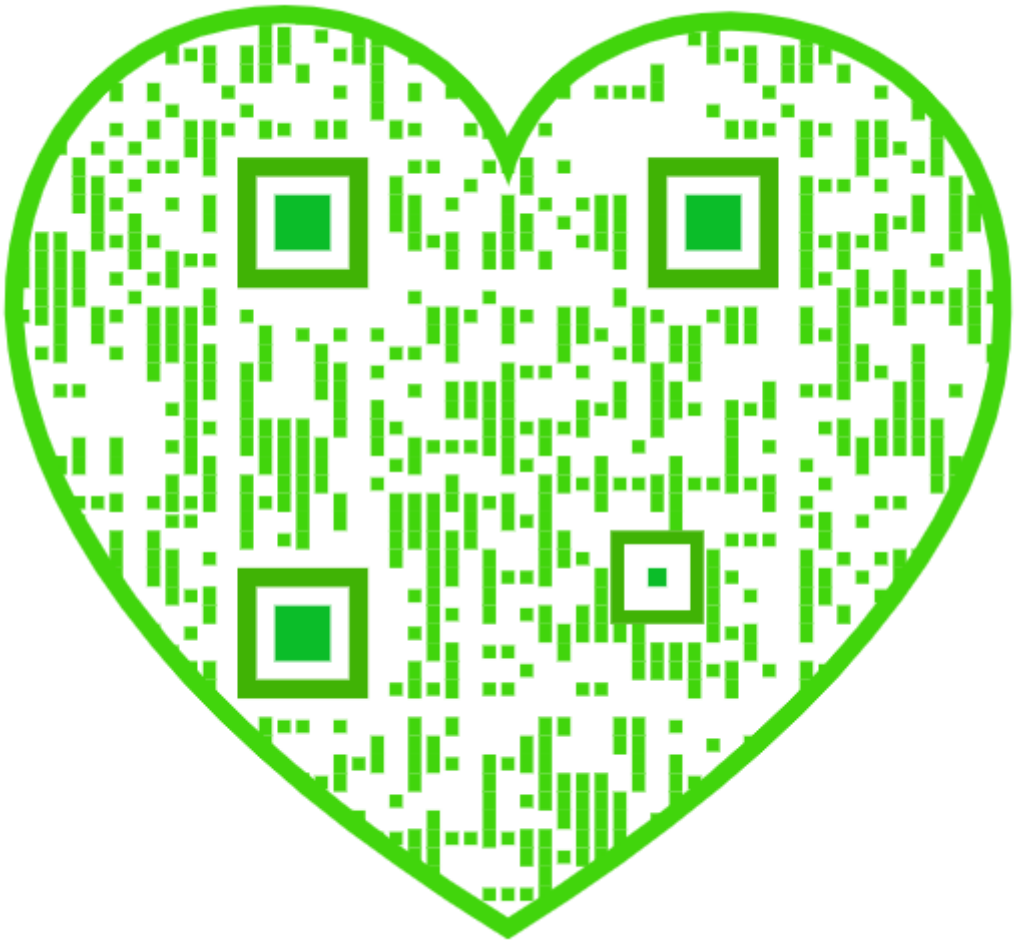

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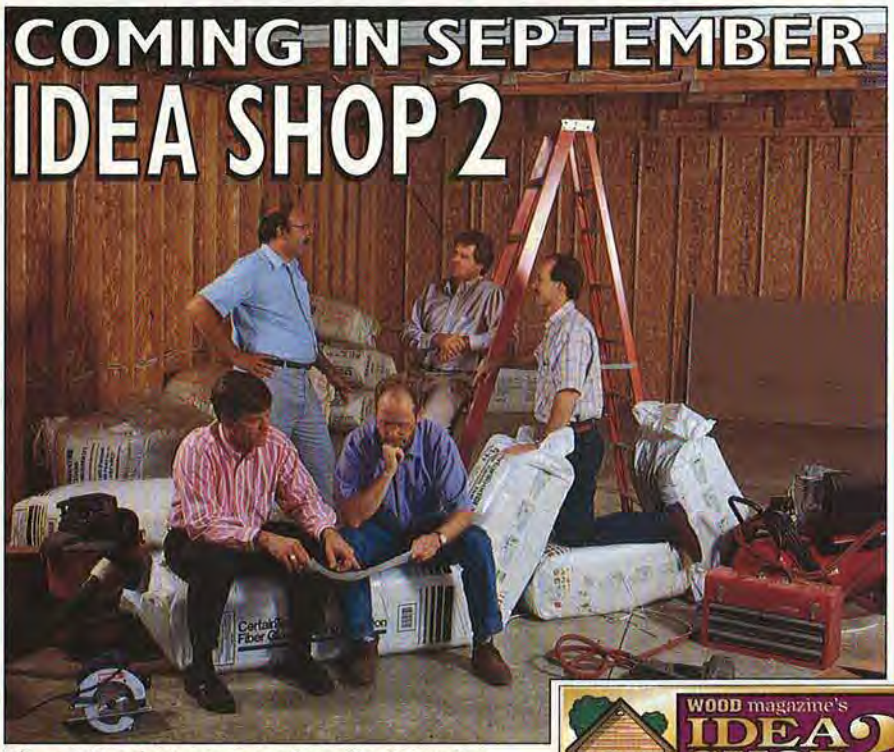
THE EDITOR'S ANGLE



The project-design team, minus Jim Downing, discussing progress at IDEA SHOP 2.

WOOD magazine's IDEA SHOP 2

In our September 1992 issue, we introduced you to the *WOOD*® magazine IDEA SHOP™, a project that took us well over a year to plan and build. And although it was one heck of an undertaking, we're glad we did it.

The IDEA SHOP gave us our first-ever opportunity to design a woodworking space from scratch. (Boy, did we ever learn a lot!) And it allowed us to share with you quite a few ideas for making your shop a better, more organized place to enjoy your all-time favorite hobby.

For these reasons, and because of the positive response we received from many of you about our first effort, we've decided to go back to the drawing board and do the sequel—IDEA SHOP 2. This time, though, the design parameters will be different. First off, because many of you do your woodworking in your garage, we're designing the shop to fit in a standard two-car garage. (You'll still be able to park two cars in there when not building projects.)

Second, because of the double-duty nature of the shop's location, the emphasis will be on portability and mobility. When not in use, your tools and equipment will store conveniently out of the way against the walls of the garage.

And third, we're designing IDEA SHOP 2 with an eye toward keeping the cost of the project down to a reasonable level. IDEA SHOP 2 probably won't look as fancy as its predecessor, but I can guarantee you that every square inch of it will perform equally well.

As you can see from the photograph *above*, we're still a long way from being done with our project. But with a little luck, and if Des Moines' rivers don't rise, we'll have the shop done and ready to show you in the September issue.

P.S. Here's hoping that you have a great summer.

Larry Clayton

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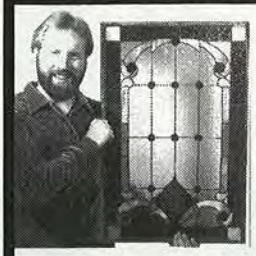

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APRIL 1994 ISSUE NO. 69

WOOD PROFILE
Eastern red cedar: the fragrant survivor 33
Pinkish heartwood and a pleasingly sweet aroma make this wood the first choice for lining closets and chests.

CRAFTSMAN CLOSEUP
Cases to catch a craftsman's fancy 35
When Illinois woodworker George Goatey builds the basic box, he's only just begun. See how he then adorns his boxes with straps and hinges, leafy plants, sunflowers, carpenter's tools, and other relief-carved designs.

The cover-up specialists: wood putties 40
Hide nail holes, splintered edges, and other flaws in wood with one of the hardworking products tested here.

SHOP-TESTED TECHNIQUES
Router-table turning 42
Make tapered spindles for table legs, and then add flutes, beads, or coves to them using our special, multi-purpose jig and a table-mounted router. Your friends will swear you've done it all on a lathe.

Stylish storage 48
Keep CDs, cassettes, and videotapes organized and in easy reach with this attractive cabinet, complete with pull-out shelves.

Boy, do they ever know their wood! 54
Travel with our own Pete Stephano as he pays a visit to the U.S. Forest Service Forest Products Laboratory in Madison, Wisconsin.

TOOL BUYMANSHIP
Bring in the air force 58
Find out how today's air compressors (and the woodworking tools and accessories available for them) can improve your shop, as we review nine different models priced under $400.

This issue's cover wood grain: Birds-eye maple

WHAT WOODWORKERS NEED TO KNOW

The nuts and bolts of threaded fasteners 64

Give your outdoor furniture and other heavy-duty projects the needed strength and durability using the hardware choices found here.

TURNING

Restaurant in the round 66

Combine the plastic cylinder of a pop bottle with a few shapely turnings and create a feeder for both you and the birds to enjoy.

CRAFT SHOP

All-star cookie jar 70

Put our router-table turning jig (featured earlier) to good use by making this lidded container. It will look great in the kitchen.

Scrollsawed safari 72

Cut out and paint a jungleful of friendly animals with this exciting puzzle. Plans include a full-sized pattern.

Comfy country chair 74

Looking for just the right outdoor furniture for your porch, deck, or patio? We've got it! Start with the chair plans inside, and then consider building the two companion pieces—a settee and a handsome table—from our mail-order plans.

CARVING

Eek! Eek! mice 78

No need to shy away from these amiable rodents. They're fun to shape, and they look right at home perched on a bookshelf or on top of the fridge.

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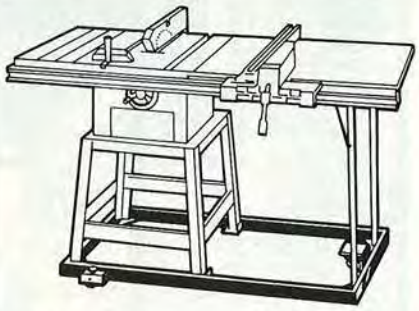

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MINI LATHE COMPARISON CHART

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Distance Between Centers	12"	12"	12 1/2"
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Max. Swing Over Bed (Dia.)	8 1/2"	5"	6"
Max. Spindle Dia.	6 1/2"	4 3/4"	3 3/4"
360 Degree Swivel Head	Yes	No	No
Bowl Turning Off Bed	14"	N/A	N/A
No. of Speeds	3	6	4
Motor	1/3 HP	Not Included	Not Included
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TALKING BACK

Print this article

We welcome comments, criticisms, suggestions, and even compliments. Send your correspondence to: Talking Back, Better Homes and Gardens® *WOOD*® Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379.

Reinforcing the wreath

After building the "Autumn Leaves" scrollsaw pattern in the October 1993 issue, I found the wreath extremely fragile. To solve this problem, I cut a ring out of ⅛" Lexan (clear-plastic sheet), 1" wide and 10" in diameter. I glued this ring behind the leaves. This clear-plastic ring gives the project some much needed reinforcement, and provides a sturdy support to hang it by.

—Kevin Stoeckle, Short Hills, N.J.

Price correction

The price of the hardware kit in the Buying Guide for the "Angle Master Miter Jig" from our January 1994 issue should be $49.95 rather than the $14.95 listed. Send orders to: Miller Hardware, 1300 M.L. King Pkwy., Des Moines, IA 50314, or call 515/283-1724. We apologize for any inconvenience this may have caused our readers.

Just plane facts

In the "He Makes Old Tools Sing Again" article in the September 1993 issue, you included a photo of four planes with their blades inserted, resting on their bases. This is a "no-no" for a conscientious woodworker. It dulls the blades and makes it necessary to hone the blades more often.

I first learned woodworking using planes before I was ever allowed the use of power tools. My seventh-grade woodworking teacher taught me that planes should sit on their blades only when they are being used.

— Glenn Perlman, Houston

Most woodworkers, Glenn, retract the plane iron up and out of the mouth (opening in the sole of the plane) to prevent dulling the cutter when storing the plane. However, setting the plane on its side when interrupting work, will help keep a sharp edge on the plane iron.

Continued on page 8

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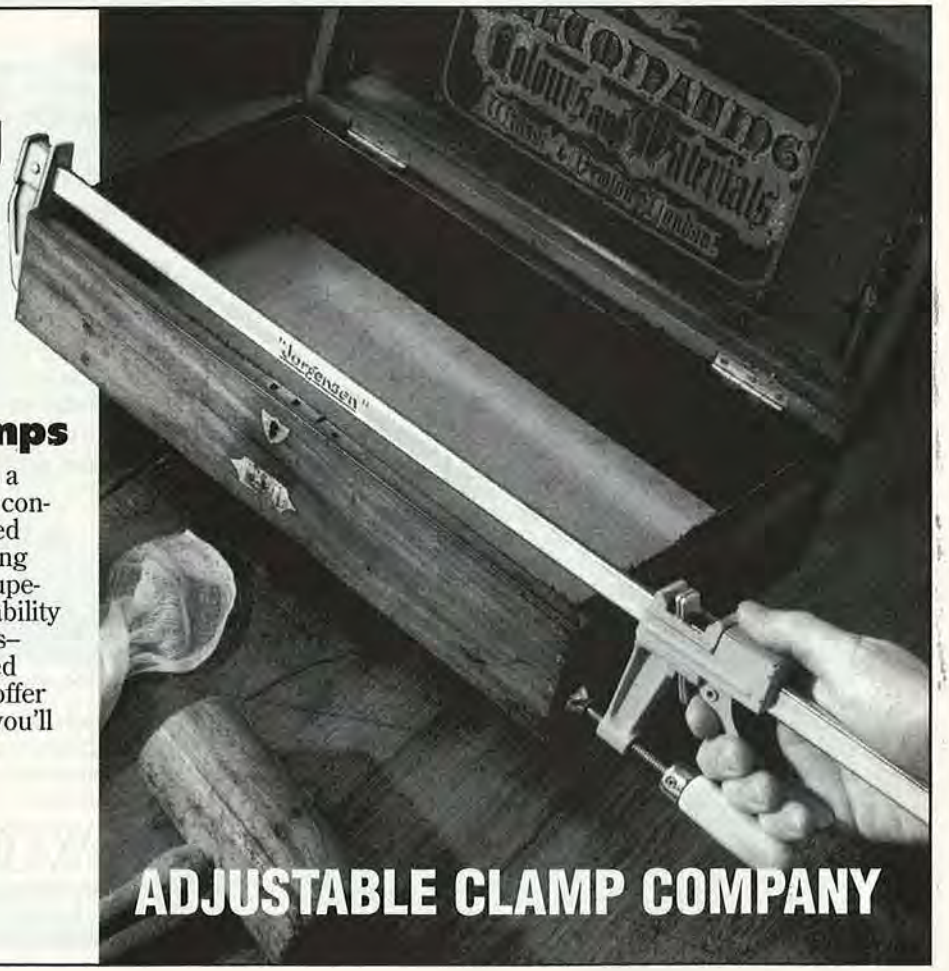

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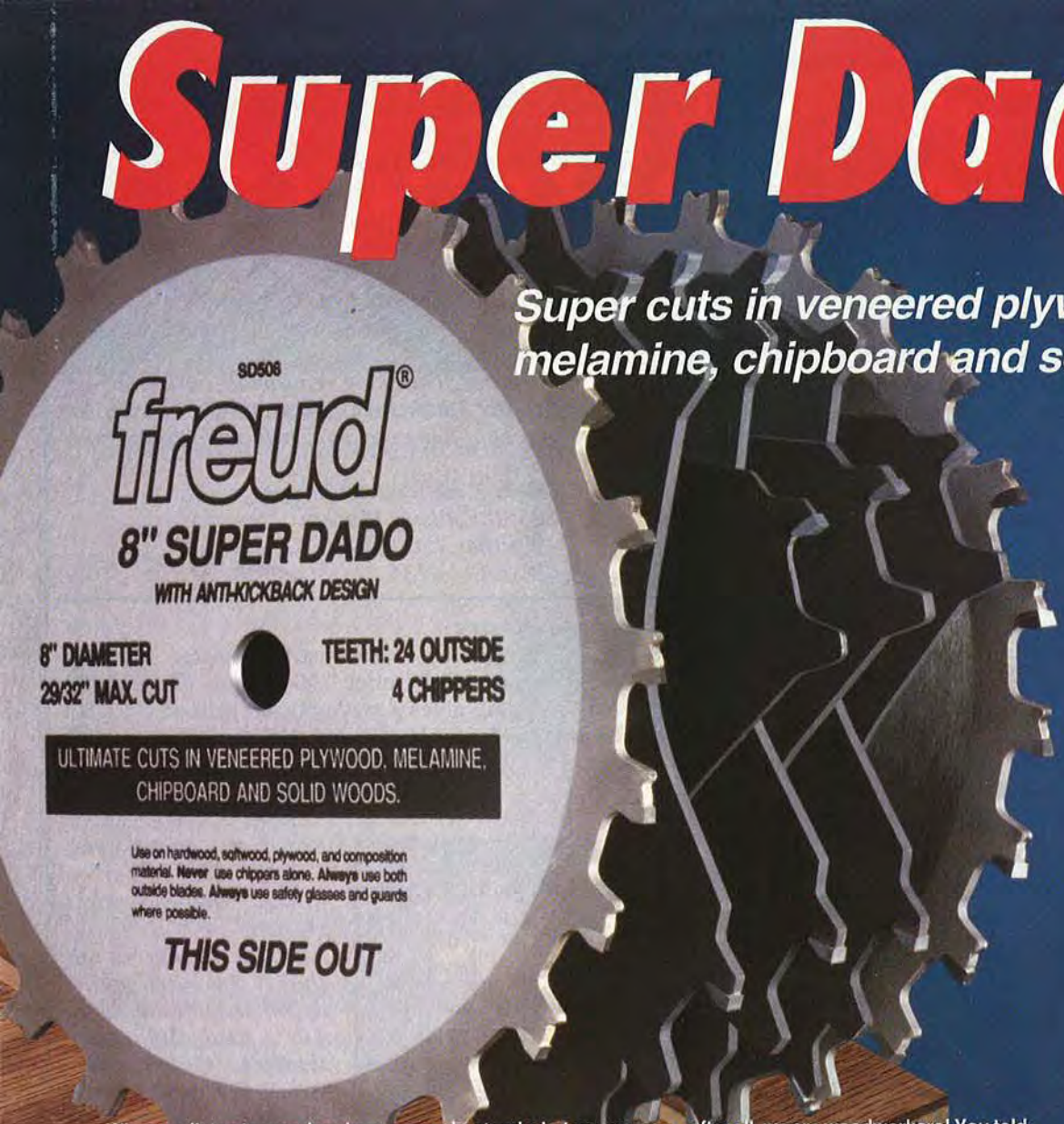
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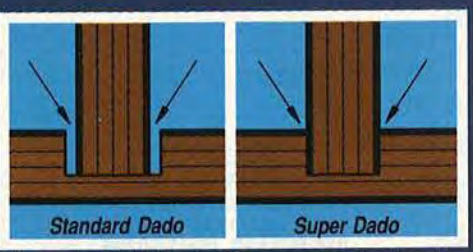

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TALKING BACK

Continued from page 6

The source of a stain

The "Autumn Leaves" article in the October 1993 issue calls for Delta's Home Decor gel wood stains. I have contacted hobby shops, and hardware and paint stores in my area, and none of them carries this product. Where can I buy this stain?

—Dale Goellsch, Grand Island, Neb.

For an answer, Dale, we contacted customer service at Delta Technical Coatings. To obtain the name of a supplier near you, call or write the company at:

Delta Technical Coatings
2550 Pellisier Place
Whittier, CA 90601
800/423-4135

Urned errors

I am in the process of constructing the "Ageless Urn" from the November 1993 issue. The carrier-board drawing gives a stave-pocket size of 1¾ × 8". The Bill of Materials calls for the body staves to be 1¾ × 8⅞". Which dimension is correct?

—Keith Lyens, Louisville, Ky.

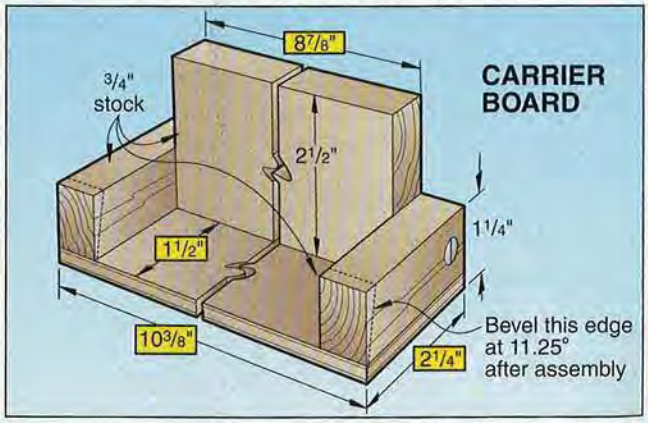
Bill of Materials

Part	Finished Size* T	W	L	Matl.	Qty.
A body staves	1½"	2"	8⅞"	A	16
B* body accents	⅛"	2 1/16"	8⅞"	W	16
C base accents	½"	5" dia.		W	1
D base	¾"	5" dia.		C	1
E neck	1½"	5½" dia.		C	1
F neck accent	½"	5½" dia.		W	1

*Please read the how-to instructions before cutting these parts to width or length.

Materials Key: A-ash, W-walnut, C-cherry,

You have sharp eyes, Keith! The carrier board stave pocket should be 8⅞" long. Another reader noted that if the stave pocket depth was changed to 1½", and the stave width to 1½", the finished urn will match the plans. In fact, we goofed on some other dimensions. The corrected Bill of Materials and the revised Carrier Board drawing here should make everything right.



Continued on page 10

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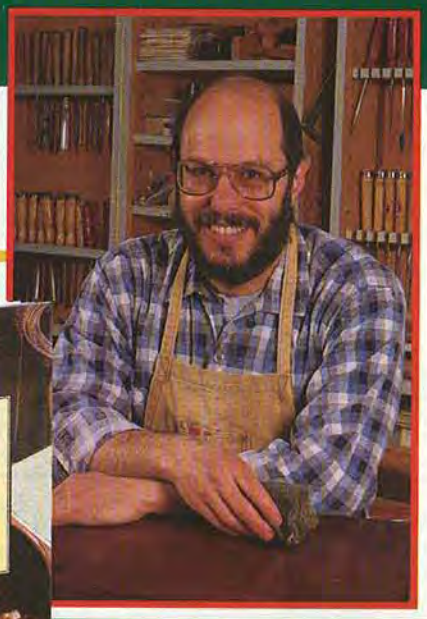

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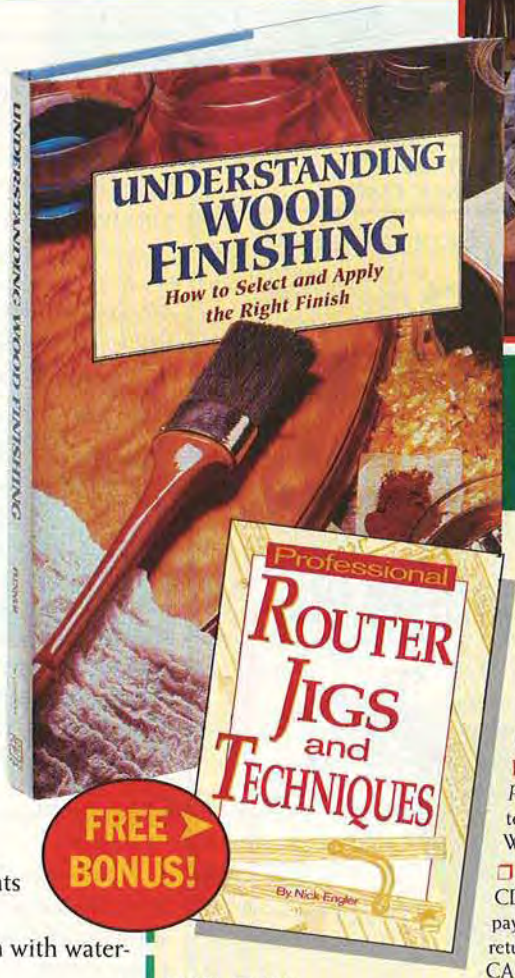

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TALKING BACK

Continued from page 8

The right number for Jet

In the "Woodworking's Sure Shots" article in the December 1993 issue, we gave the wrong 800 number for Jet Equipment and Tools. The correct number is: 800/274-6848.

Give Grizzly a fair shake

I do not believe you gave Grizzly a fair shake in the "Low Cost Lathes" article in the October 1993 issue. You said you could not get their copy attachment to work on the G1174 lathe. I own and use this copy attachment every day, and I find it works very well. Granted, it takes time to set up and tune this copier, but the result is well worth the effort.

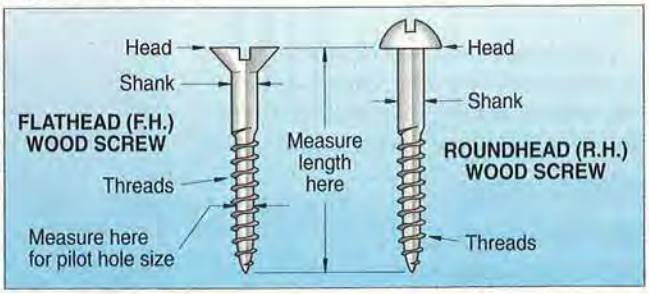
—Jim Boyd, North Robert, Vt.

More detail on screws

The article "What Woodworker's Need to Know About Screws" from the October 1993 issue didn't answer some of my questions. The article would have benefitted from a drawing of a screw, showing the parts and where measurements are taken.

—Edward F. Roubal, Roswell, N.M.

Ed, your wish is our command. We hope the drawing below helps.



And some more

The "What Woodworkers Need to Know About Screws" article in the October 1993 issue did not give any rule of thumb for selecting the size and length of a wood screw. How does one make a choice?

—Ken Seals, Edenton, N.C.

Ken, we know of no absolute rule on choosing screw sizes and lengths. Here, however, is a chart comparing sizes and uses.

SIZE	USES	EXAMPLES
#2 – #6	Attaching small hardware	Plates, brackets, braces
#6 – #8 (Drywall and particleboard screws)	General assembly with power driver	Case assembly
#7 – #9	General assembly	Fastening two pieces of ¾" stock
#10 – #14	Heavy-duty	Joint reinforcement and large hardware

Continued on page 12

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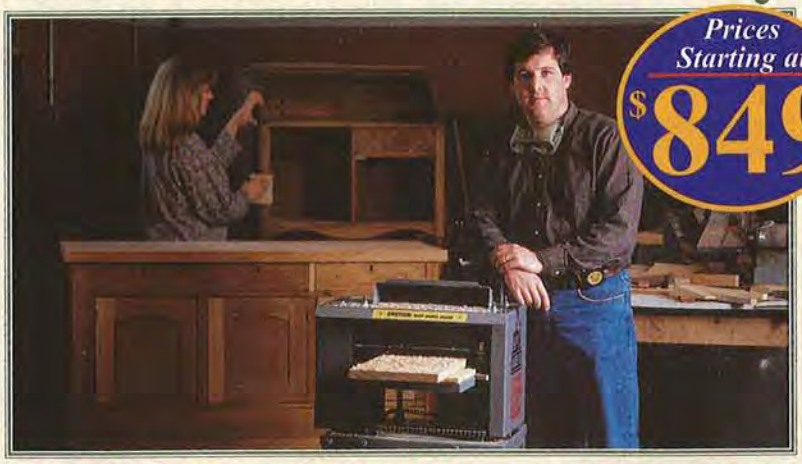

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TALKING BACK

Continued from page 10

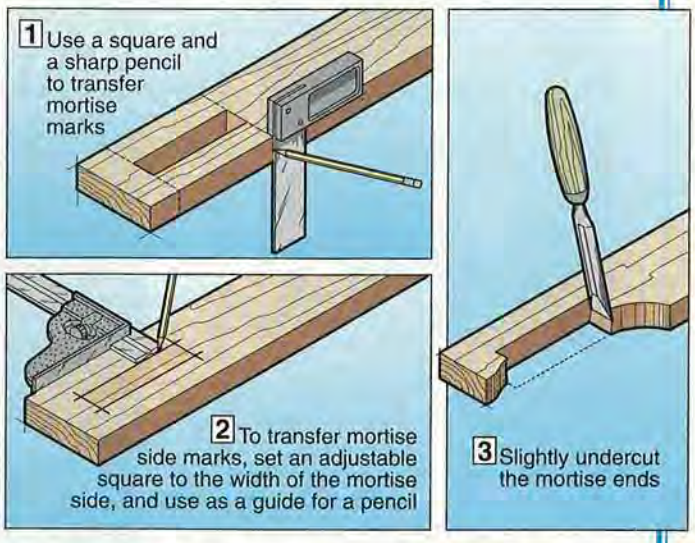
Mark both sides

The outdoor oak and mahogany furniture from the June 1993 issue looked like a project I could attempt, and it really turned out quite nice. This was my first attempt at making mortise and tenon joints, and I had trouble with the mortises. The top side came out fine, but I struggled with the fit on the back of the mortise. Are there some "tricks" to help with this?

—Matt Hawk, Woodstock, Ga.

Mark and cut a through mortise from both faces of the board, Matt, to get a clean, crisp joint. Lay out the mortise sides and ends on one face of the board. Transfer the end lines of the mortise to the opposite face using a square, (see drawing). Transfer the side lines of the mortise to the second face using an adjustable square and sharp pencil (see drawing), or better yet, a marking gauge.

Now, drill out the waste material on the mortise. Then start the corner cleanup on the first side, using a chisel to cut about half way through the board, and undercutting slightly on the ends. (See drawing.) Turn the piece over, and clean up the other half of the mortise.


1 Use a square and a sharp pencil to transfer mortise marks
2 To transfer mortise side marks, set an adjustable square to the width of the mortise side, and use as a guide for a pencil
3 Slightly undercut the mortise ends

Use a chisel to cut downward, only, when cleaning out the mortise. Prying out chips with the chisel will round over the mortise edges. Start the cleanout cuts in the middle of the mortise and pare towards the sides and ends. Keep the bevel of the chisel facing the center of the joint to help maintain a crisp, straight, mortise edge.

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32-100 Plate Joiner 264
33-060 Sidekick F&T Saw 368
36-040 8" Compound Miter 155
36-090 Sidekick 10" Miter Saw 218
36-220 10" Compound Miter 234
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While other geniuses have been out collecting their Nobel Prizes, ours have been experimenting in the basement again.

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EARN CASH, PRIZES FOR YOUR TOP SHOP TIP

Do you have a great shop tip (or two) you'd like to share with other *WOOD®* magazine readers? For each published submission, you will get at least $40 from *WOOD* magazine (as much as $200 if we devote a page or more of space elsewhere in the magazine to your idea). You also may earn a woodworking tool if we select your idea as the Top Shop Tip for the issue.

We try not to use shop tips that have appeared in other magazines, so please send yours to only one. *We do not return shop tips.* Mail your tip(s), address, and daytime phone number to:

Top Shop Tip
WOOD Magazine
1912 Grand Ave.
Des Moines, IA 50309-3379

No more digging in the sawdust for nuts and bolts

You can lose a lot of nuts, screws, plugs, and small parts when you vacuum dust from your benchtop or drawers.

TIP: Cover the end of your shop-vacuum hose with a screen mesh and secure it with duct tape or a rubber band. Choose a mesh size large enough so that it won't clog up, but small enough to hold back the items you want to keep. When you turn on the vacuum, dust passes through the mesh, but nuts, bolts, and small items stop at the screen where you can brush them off easily.

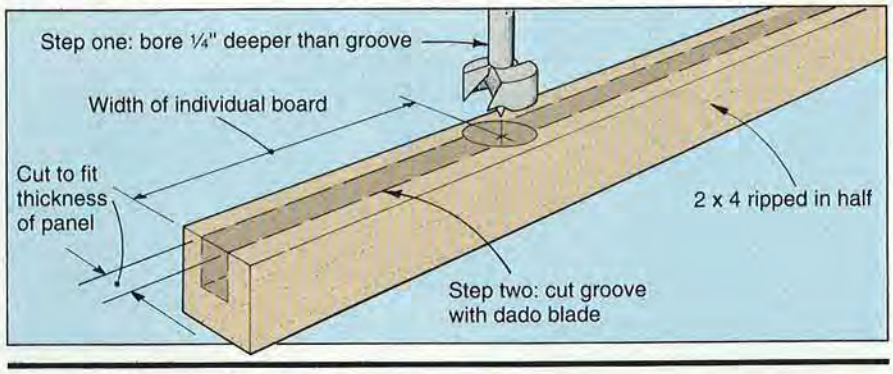
—Jerry Roy, Vinemont, Ala.

Get a grip on glue-ups with an end brace

Keeping the boards in a panel flat during edge-gluing operations challenges even the best woodworkers. Dowel pins or biscuit joinery solve the problem, but both take a lot of time and specialized equipment.

TIP: To keep the individual boards flat, make two braces that slip over the ends of your panels. Cut a 2×4 as long as the panel is wide, and rip it in half to make the two braces. Mark the location of the soon-to-be glue lines on the braces, and bore holes at those locations with a Forstner or spade bit as shown in the illustration. Next, cut a dado about ¾" deep along the length of the braces as wide as your panel is thick. Glue and clamp the panel, and slip the two braces over the ends, centering the gluelines on the holes. The holes prevent the glue squeeze-out from attaching the brace to the panel.

—Allen L. Formby, Springhill, La.


Step one: bore ¼" deeper than groove
Width of individual board
Cut to fit thickness of panel
2 x 4 ripped in half
Step two: cut groove with dado blade

TOP SHOP TIP

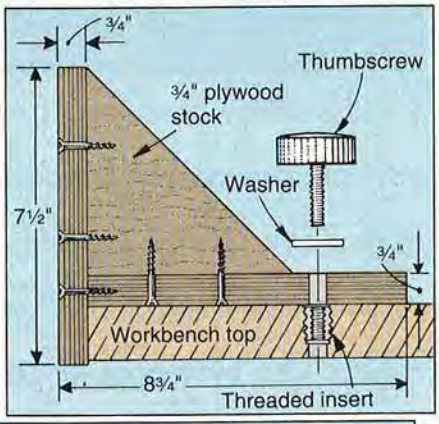
For his shop-tip prize, Allen recieves a 2-hp BOSCH Model B1450 Electronic Plunge Router.

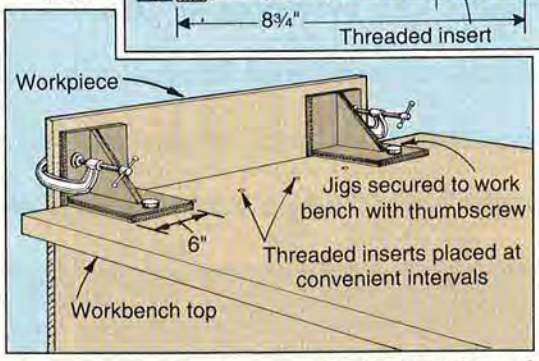
Jigs hold panels on edge

Clamping any long narrow object, such as a door or a sheet of plywood on edge requires a door buck or other specialized equipment that most home woodworkers don't own.

TIP: Clamp large, bulky objects to your workbench vertically with these two right-angle jigs. Glue and screw together these jigs from ¾" plywood. Place threaded inserts in your workbench at regular intervals, and fasten each jig to the workbench with a thumbscrew and washer. Secure your workpiece to the front of the jigs with C-clamps, and you're ready to work.

—Bob Shermer, Los Osos, Calif.





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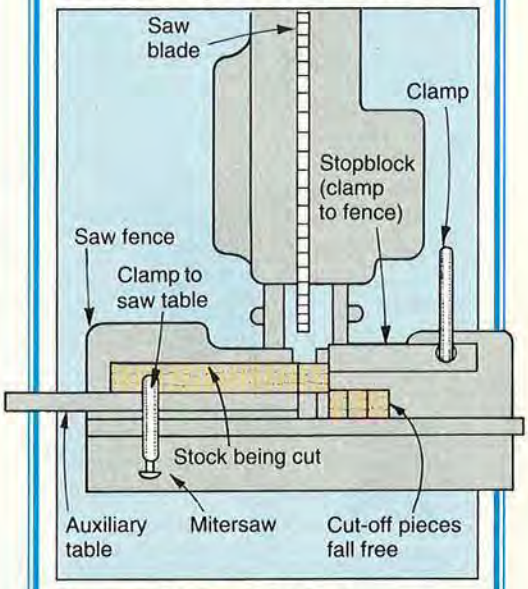
TIPS FROM YOUR SHOP (AND OURS)

Continued from page 14

Multiple cuts go faster with a step on the table



Even with a stopblock on your mitersaw fence, making repetitive cuts takes time. You have to make the cut, wait for the blade to stop to safely remove the piece, and then slide the stock over to saw again.

TIP: Speed things up and make the job safer at the same time by adding an auxiliary table and high-mounted stopblock as shown *above*. Clamp the ¾"-thick auxiliary table (plywood or particleboard will work fine) to the mitersaw table, and saw the end. Mark your stock where you wish to cut. Align that mark with the side of the blade opposite the auxiliary table. Position the stopblock against the upper corner of the stock to be cut, and clamp it to the mitersaw fence.

Now, the cut-off piece will fall to the saw table. Then, as you slide the stock to the stopblock for the next cut, it pushes the piece out of the way. With this setup, the cut piece cannot bind between the stopblock and the blade as the saw returns. And because sawdust won't build up against the stopblock, you won't end up with undersized pieces.

—Harlan Flock, Long Beach, Calif.

Continued on page 19

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9647	TIGER CUB RECIP SAW KIT	115
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6126	6" RANDOM ORBIT SANDER	115
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DW431	3" X 21" DSTLS BELT SANDER VAR SP	182
DW610	1 1/2 HP ROUTER, 9 AMP	147
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DW615	1 1/4 HP PLUNGE ROUTER, VAR SP	158
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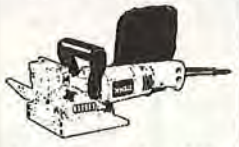

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TIPS FROM YOUR SHOP (AND OURS)

Continued from page 16

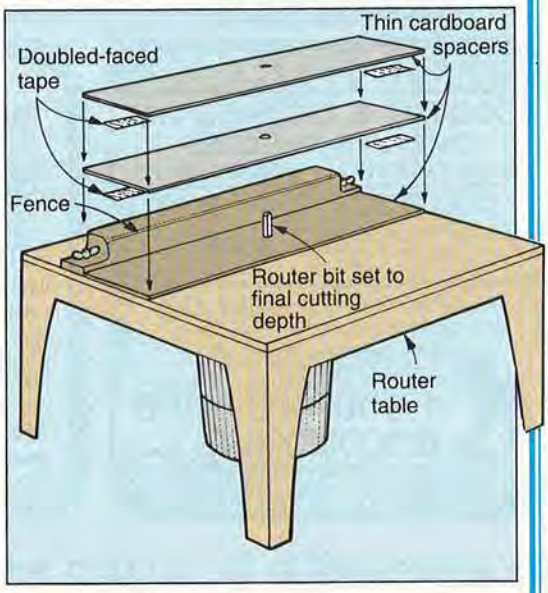
Multiple-pass router cuts go quickly

You like to make certain cuts with your table-mounted router in steps, cutting a little deeper each time. What you don't like is reaching under the table to adjust the router 1/16" or 1/8" after each cut—it sure slows down the job.

Make your first cut with all of the shims in place. Remove one for each subsequent pass until you've removed them all for the final cut. Each one you remove increases your depth of cut by its thickness, so you never have to mess with the router.

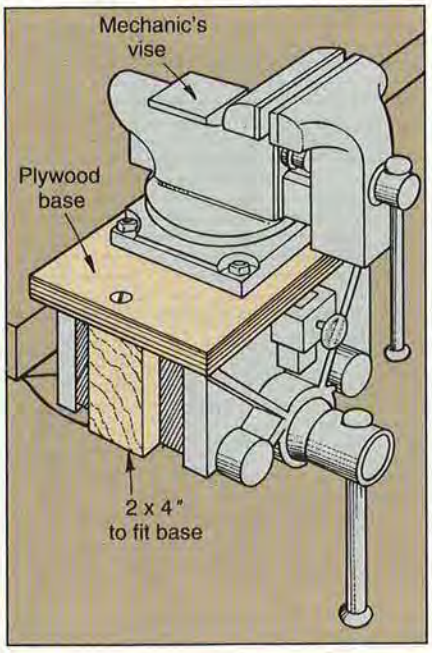
—Bob Agner, Muskego, Wis.

TIP: Set your router to the final cut depth, and then leave it there. Now, make your depth adjustments by laying several pieces of thin cardboard, artist's mat board, or poster board (all available from art-supply dealers and some crafts shops), or even 1/8" hardboard on the router table. Each piece must be wide enough and extend far enough past the bit on each side to support your workpiece properly. Cut a hole in each piece for the router bit to protrude through, and secure the pieces to the table with double-faced tape.



Bench vise stays scarce until you need it

A mechanic's bench vise often comes in handy in a woodworking shop, but it isn't very handy to have it taking up most of a corner of the bench when you're not using it.



TIP: Mount the vise on a base that clamps into your woodworking vise. Cut a piece of 3/4" plywood as long as your woodworking vise's jaws, and about 1" wider than the width of the mechanic's vise. Mark and drill the plywood for 3/8 or 1/2" T-nuts or threaded inserts (depending on the vise's mounting-bolt size). Cut a piece of 2×4 to fit lengthwise along the center of the bottom of the plywood. Fasten the narrow edge of the 2×4 against the plywood with screws and glue. Bolt the mechanic's vise to the base assembly. Store the vise and base assembly out of the way. Then, when you need the mechanic's vise, just secure the base in your woodworker's vise.

—Alan Holtz, Torrance, Calif.

Continued on page 21

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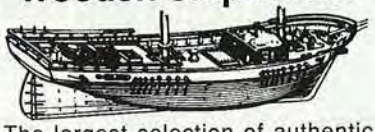

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TIPS FROM YOUR SHOP (AND OURS)

Continued from page 19

Benchtop equipment doesn't have to be on the bench

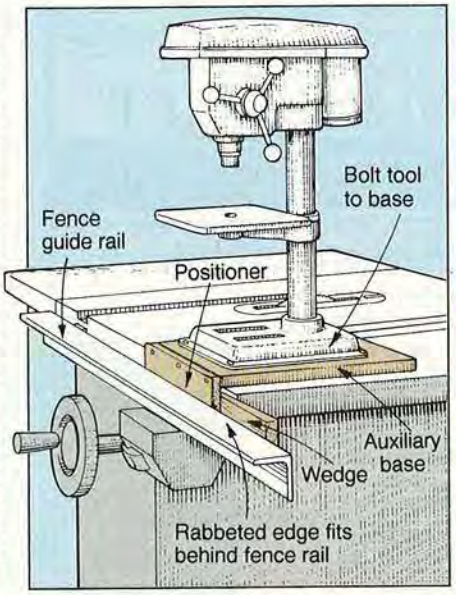
With benchtop space at a premium for most of us, permanently mounting power tools is out of the question. Here are two approaches to quick, solid temporary mounting.

TIP 1: Turn your tablesaw into a tool stand. First, cut a ¾"-thick auxiliary base for the tool. On the underside, attach a strip that fits your saw's miter-gauge groove.

Then, rabbet one edge of another piece of ¾" stock, forming a lip that fits between the table edge and rip-fence guide rail. Attach this positioner to the front edge of the auxiliary base, perpendicular to the miter-gauge strip, rabbet facing out. Mount the tool.

To set up, place the auxiliary base on the saw table (the miter-gauge strip locates it). Secure it with a wedge between the edge of the table and the backside of the positioner.

—Al Eichman, Hilton Head Island, S.C.

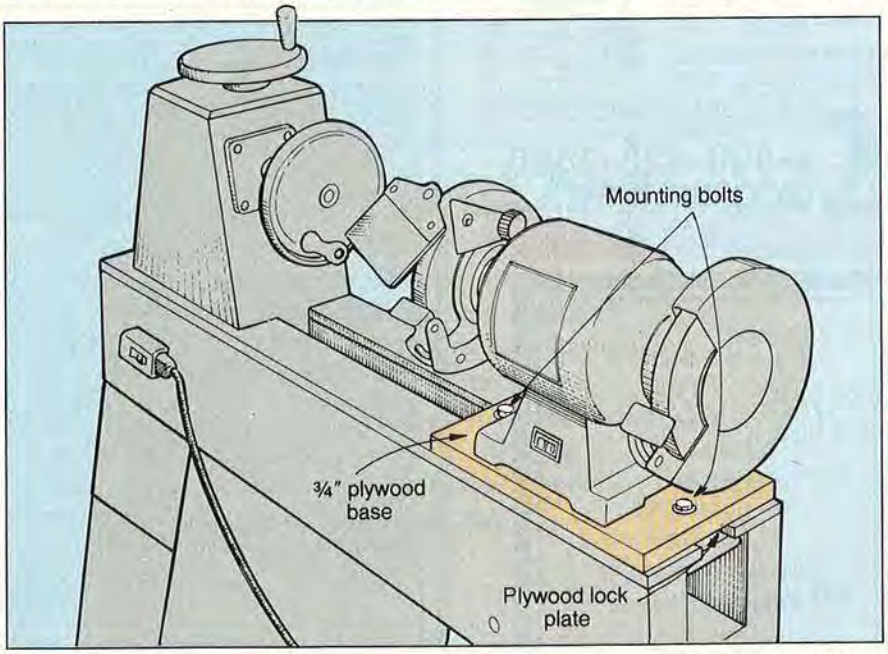


TIP 2: Look to your lathe for a rock-solid tool stand. The lathe bed makes an ideal platform for benchtop tools.

Cut an auxiliary base large enough to accommodate the tool and span the lathe bed. Next, provide a means to clamp it to the bed. In most cases, a simple nut, bolt, and clamping-block arrangement will do the trick. You could use U-bolts or a yoke for a lathe with tubular ways.

Fasten the tool to the auxiliary base. Then, to use the tool, slide the tailstock up out of the way, set the mounted tool on the lathe bed, and clamp it.

—William Dawson, Jonesboro, Ga.



Continued on page 22

"I round off all the sharp edges so it's safer for kids."

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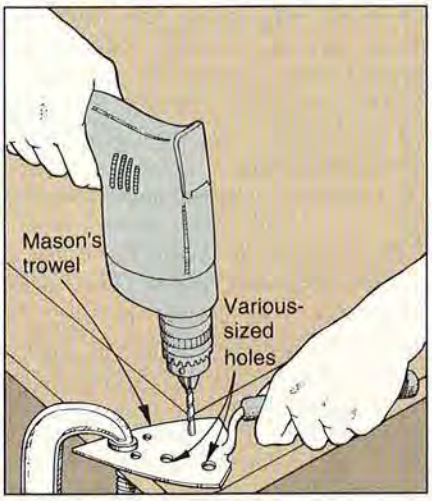
Continued from page 21

Whip wandering bits with a mason's trowel

Try to bore into metal with a portable drill, and your bit wanders all over, marring your project. Without a drill press, how do you control the bit?

TIP: Make your own drill guide by drilling an assortment of your most commonly used hole sizes in a mason's trowel. To use, start your hole with a metal punch, hold or clamp the trowel flat on the workpiece where needed, insert the bit in the appropriate hole, and drill.

—George L. Williams, Elk Grove, Calif.



MORE TIPS FROM OUR WOODWORKING PROS

- Want to make curly tails for cut-out or carved animals? Check out the basket reed tails on the carved mice and the technique for making them on *page 4.*
- Cutting a perfect circle freehand is just about impossible. But with the jig we've built on *page 43* and a disc sander, you can sand dimensionally true circles.
- Adapt the auxillary faceplate shown on *page 67* for turning toy wheels. Select the center bolt to fit the axle hole of a bandsawed wheel blank.

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Better Homes and Gardens
***WOOD*® Magazine**
1912 Grand Ave.
Des Moines, IA 50309-3379

De-spotting a tabletop

Is there a method to get rid of white marks left on a tabletop after someone mistakenly placed wet clothing on it?

—Robert Tedrick, North Hills, Calif.

To remove water spots from a finish, Bob, you need to remove the layers of finish that have become cloudy due to water damage. You can do this by lightly rubbing the whitened area with a fine abrasive, and repolishing the abraded finish to the original gloss.

For the traditional approach, use a small amount of rottenstone or a fine pumice, combined with boiled linseed oil, to abrade and polish the cloudy area. Rub this mixture into the affected area with a soft cloth, until the cloudy finish disappears. Apply a wax to blend the repair into the surrounding unmarred finish.

For a more contemporary approach, try Micro-Mesh abrasives. Similar to an extremely fine sandpaper, this product comes in grits from 1500 to 12000. As you work through a succession of grits, the finer abrasives will produce a glossier surface, making a match of the original finish easier. For more information on this approach, contact:

C.W. Crossen Co.
706 E. River Drive
Davenport, IA 52803
800/722-9342

If the water spot has penetrated through the layers of finish, then you need to remove the finish down to the wood. Touch up the area with a similar finish, and blend the repair into the tabletop with one of the above approaches. We do not recommend the use of polyurethane varnishes for repair of older finishes.

Continued on page 26

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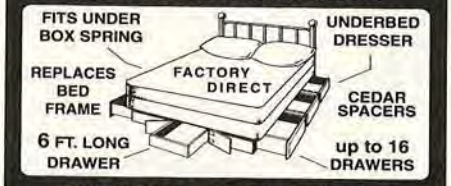

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ASK WOOD

Continued from page 24

How to launch a woodcraft business

I want to start a woodcraft business to increase my income. Can you advise me on the best way to sell my work?

— Rashid Diyab, Richmond Hill, N.Y.

First of all, Rashid, you need to make contact with a lot of people in the woodcraft business. We presented your question to Dean Young, owner of Dean's Dreams, a retail woodcraft store in Des Moines, and a veteran crafter. He said, "Get out there. Talk with people, talk with show promotors, find out what people buy, and build it better and cheaper than your competition. The market is always changing, and this requires flexibility in the design and selection of your finished product. Look at what the other crafters have done in displaying their work, and design a display system that will meet many situations."

We also recommend going to crafts shows and talking with vendors. Many of the better craftspeople will give tips to beginners, as they know that better competition and high-quality work will bring more people to the shows. Many crafters also will display flyers for future shows.

And don't forget to contact woodworking clubs in your area. These groups often will have members who sell their products on the crafts circuit, and often will have information on local shows. Check with your hardwood supplier and community adult education classes for information about woodworking clubs in your area.

Another source of information is *The Crafts Fair Guide,* a quarterly publication that lists crafts shows around the nation and presents reviews of the show and the promoter. The subscription cost of this guide is $42.50 per year or $15 per issue. You can write to the publisher at:

The Crafts Fair Guide
P.O. Box 5508
Mill Valley,CA 9494

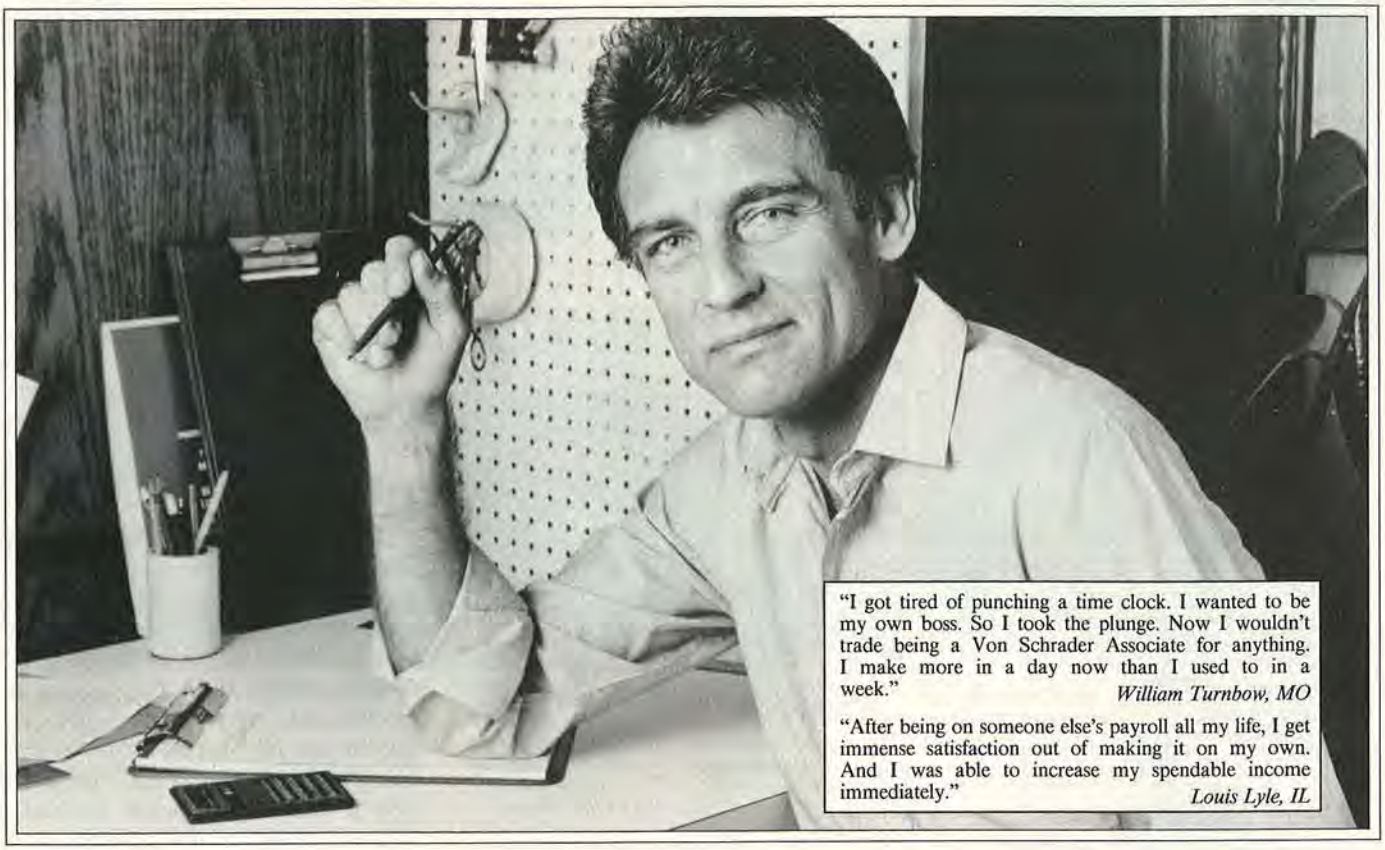
Leave it to the pros

Can you furnish tips on sharpening Forstner bits?

—R.C. Profitt, Oak Harbor, Wash.

For an answer, we contacted Dave MacColl of Forrest City Tool Works, a manufacturer of Forstner bits. Dave said, "Forstner bits are usually professionally sharpened. This ensures concentricity, cutting edge height, and longer tool life."

Jim Boelling, *WOOD*® magazine project builder, agrees with this point of view, saying, "These expensive drill bits require close sharpening tolerances beyond the capabilities of most home craftsmen."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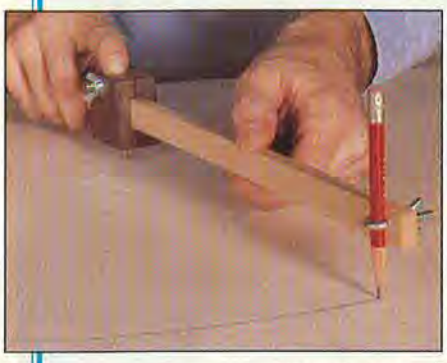

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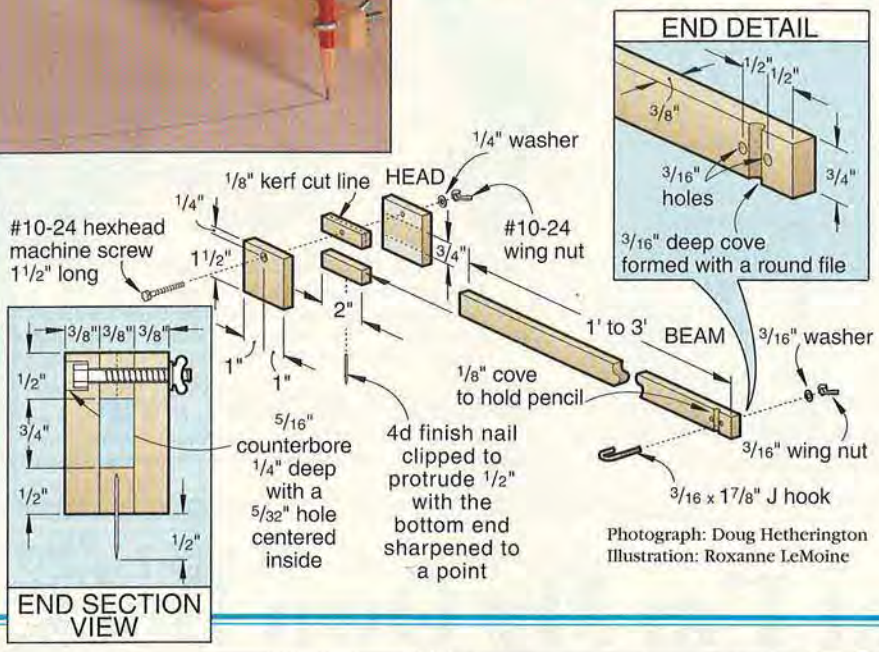

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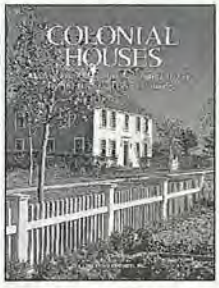

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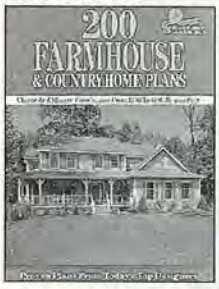

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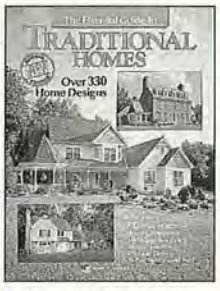

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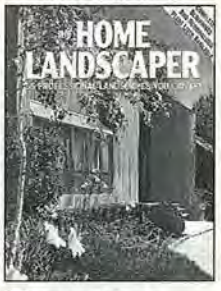

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During my test drive of the sander, I realized right away that the tool cuts aggressively. I had to keep it moving over the work surface to prevent it from gouging or removing too much material. I also learned that two-hand operation is a must.

In addition to the tool's ample power, I particularly liked the clear view I had of the sanding action and its instant impact on the wood. I knew exactly how much material still needed to be removed at all times, due to the narrow, extended arm supporting the sanding belt. This design feature makes the sander an excellent tool for flush-sanding dovetails or protruding dowel ends.

If you sand a lot of woodwork, this tool will save you time and the skin on your fingertips. I give it a thumbs up, and recommend it for the serious home woodworker.

—Tested by Jim Boelling

Black & Decker Quantum Variable-Speed ½" Belt Sander, Model No. BD5900, about $60. Where Black & Decker tools are sold . Or call 800/762-6672.

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Benchtop jointer gives big tool performance

Smaller tools usually translate into reduced performance, but not so with this new Delta 6" benchtop jointer. In addition to excellent jointing and planing, this machine offers variable speeds from 6,000 to 11,000 rpm and easy-to-adjust knives.

Setup took me just 15 minutes including assembly of the fence, cutter guard, and cutterhead lock. The cast-aluminum infeed and outfeed tables line up level with one another, providing a total support length of 30".

During my tests, I edge-joined ¾"-thick pine and 2"-thick oak. The aluminum cutterhead, powered by a 10-amp motor, plowed through it all without hesitation or strain, even when removing 1/16"-worth of stock. I did get some chatter when surface-planing 6" material, but the action was controllable. In both jointing and planing, the end results felt as smooth as if I'd sanded the wood.

The 4½×20" extruded-aluminum fence tilts from 0° to 45° with ease and accuracy, and provides rock-steady support when jointing wide lumber. A flip-up cutterhead lock and two adjustment screws make blade-height changes, normally a frustrating task, fast and convenient.

I keep two full-size jointers in my shop, and I honestly like this benchtop model as well as either of them. The universal motor on the Delta benchtop jointer makes a lot of noise (as do all universal motors), so I recommend that you use ear protection. But that's the only drawback I could find.

—Tested by Bob McFarlin

Delta 6" Variable-Speed Benchtop Jointer, Model 37-070, about $280 at Delta dealers. Call 800/438-2486 for more information.

Swedish combo square proves extremely accurate

Most combination squares offer reasonable precision, but you won't find their angles deadly accurate over their length. This Nobex Automatic Locking Square gives you both superb accuracy and fold-up convenience.

Positive stops at 45°, 90°, and 135°, enable you to quickly lock the blade at the most commonly used angles. You can also set it at any odd angles between the stops. The company claims accuracy to within .04" over its length, but my tests showed it much more accurate, within .003". The other squares I've found that test this accurate cost around $50.

The only complaint I have is that the English scale steps off in ¼" increments—too big for many of my woodworking measurements. The metric scale, as you might expect coming from a Swedish manufacturer, uses much finer millimeter markings.

—Tested by Bob McFarlin

Nobex Automatic Locking Square, $20.90, ppd., from Woodworker's Supply Inc., 1108 North Glen Rd., Casper, WY 82601 Call 800/645-9292.

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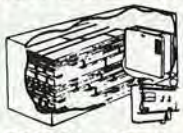

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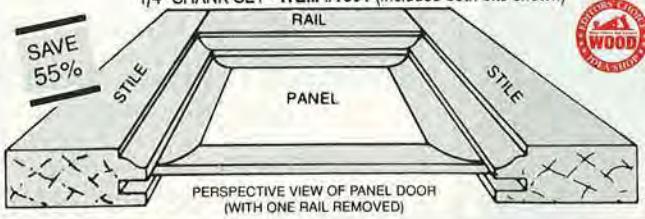
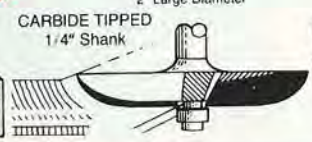


PERSPECTIVE VIEW OF PANEL DOOR (WITH ONE RAIL REMOVED)

RAISED PANEL BIT SUPPLIED WITH BALL BEARING



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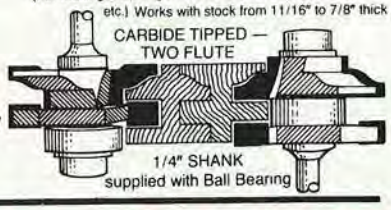

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#1309	45° CHAMFER - 3/8" Cutting Length	1/4"	$13.00
#1310	45° CHAMFER - 5/8" Cutting Length NEW !	1/4"	$15.00
#1311	45° CHAMFER - 5/8" Cutting Length	1/2"	$17.00
#1312	THUMBNAIL - 1- 3/16" Large Diameter	1/4"	$18.50
#1313	THUMBNAIL - 2- 5/8" Large Diameter	1/2"	$35.00
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#1315	ROUND OVER - 3/16" Radius	1/4"	$11.00
#1316	ROUND OVER - 5/16" Radius	1/4"	$14.00
#1317	ROUND OVER - 1/4" Radius NEW !	1/2"	$12.00
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#1325	RABBETING - 3/8" Deep	1/4"	$13.00
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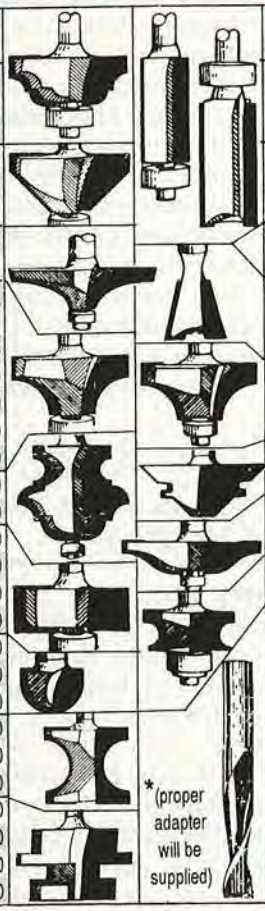

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#1338	FLUSH TRIM - 1/2" Diameter — 1" Cutting Length	1/4"	$ 8.00
#1339	FLUSH TRIM - 1/2" Diameter — 1-3/16" Cut. Length	1/2"	$ 8.00
#1340	PATTERN / FLUSH TRIM - 1" Cutting Length	1/4"	$15.00
#1341	PATTERN / FLUSH TRIM - 1" Cut. Length NEW !	1/4"	$17.00
#1342	PATTERN / FLUSH TRIM - 1" Cutting Length	1/2"	$19.00
#1343	KEYHOLE CUTTER - 3/8" (bit not	1/4"	$ 8.50
#1344	KEYHOLE CUTTER - 1/2" shown)	1/4"	$ 9.00
#1345	DOVETAIL (HSS) - 1/4" Diameter — 7-1/2°	1/4"	$ 6.50
#1346	DOVETAIL - 1/2" Diameter — 14° NEW !	1/4"	$ 6.00
#1347	DOVETAIL - 1/2" Diameter — 14°	1/2"	$ 6.50
#1348	BEADING - 1/4" Radius	1/4"	$13.00
#1349	BEADING - 3/8" Radius	1/4"	$15.50
#1350	BEADING - 1/2" Radius	1/4"	$17.00
#1351	LOCKMITRE - 7/8" Cutting Length NEW !	1/4"	$32.00
#1352	LOCKMITRE - 1-1/8" Cutting Length	1/2"	$45.00
#1353	OGEE RAISED PANEL - 2" Large Diameter	1/4"	$28.00
#1354	OGEE RAISED PANEL - 2-3/4" Large Diameter	1/2"	$32.95
#1355	EDGE BEADING - 3/16" Diameter of Circle	1/4"	$15.00
#1356	EDGE BEADING - 5/16" Diameter of Circle	1/4"	$15.50
#1357	SPIRAL UPCUT - 1/8" Diameter (solid carbide)	1/4"*	$ 9.00
#1358	SPIRAL UPCUT - 1/4" Diameter (solid carbide)	1/4"	$12.00
#1359	SPIRAL UPCUT - 1/4" Diameter (solid carbide)	1/2"*	$12.00
#1360	SPIRAL UPCUT - 3/8" Diameter (solid carbide)	1/2"*	$24.00
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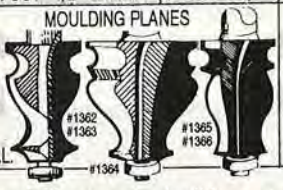
#1366	1-11/16" C.L.	1/2"	$31.95



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EASTERN RED CEDAR

The fragrant survivor

In the 1920s, Virginia apple growers waged war on the eastern red cedar. Because the species can harbor a harmful fungus disease, it was officially proclaimed cheaper to eradicate eastern red cedar trees found near orchards than to spray the apple trees in them! But by then, eastern red cedar had already survived a major attack.

For the 100 years prior to the First World War, U.S. eastern red cedar had supplied the world with pencil wood. During the heydays of this harvest, rafts of eastern red cedar logs containing millions of board feet were regularly floated down the rivers of Tennessee and other states where the tree grew in abundance. Later, pencil-cedar buyers sought out whole cabins and even fences made from this long-lasting, easily worked wood.

Pencil manufacturers now rely on Pacific Northwest cedar and imported stock. And apple growers control disease without felling cedar trees. And although large trees are few and far between, eastern red cedar still maintains its traditional role as a woodworking stock that's perfect for trunks, chests, and closet linings because the aromatic wood lends its fragrance to stored items.

Wood identification

Depending on where you live within its range, you may call eastern red cedar (*Juniperus virginiana*) any one of a number of names, such as pencil cedar and aromatic red cedar. Yet, the species isn't a cedar at all; it's really a juniper.

The second-growth eastern red cedar you now find tends to be 16" or less in diameter and 20' to 50' tall. It grows practically anywhere, except in damp, spongy lowlands.

Unlike most evergreens, eastern red cedar has lacelike fronds that turn brown with age, rather than needles. By fall, the tree bears pale, blue-green berries that were once used to flavor gin. Reddish-brown in color, the bark of eastern red cedar readily shreds and strips from the tree. Inside, the pinkish heartwood that eventually darkens to a deep raspberry shade is bordered by a thin band of starkly pale, nearly white sapwood.

Although light at about 33 pounds per cubic foot air-dried, the wood rates as having 80 percent the strength of oak. If you doubt its identity, smell the stock close to a knot. The wood's natural oil has a pleasant aroma.

Uses in woodworking

Most woodworkers recognize the widespread use of cedar for closet and blanket-chest linings. But the wood has long been the stock for boat trim, jewelry boxes, and novelty items.

Natural range

Availability

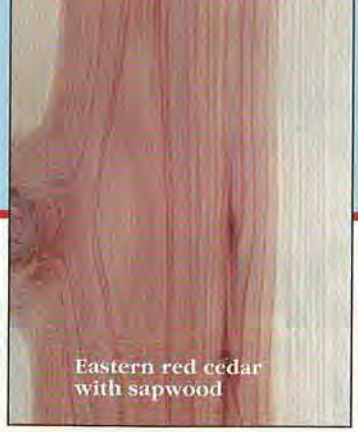
Because eastern red cedar has earned cabinet-wood status, the softwood follows hardwood grades. Most boards bear the common label and a price of about $1.50 per board foot rough-surfaced. You'll rarely see boards wider than 6", longer than 6', or thicker than 1". For closet/ chest linings, you can buy eastern red cedar plywood in ¼"–¾" thickness, plus chipboard and 5/16" tongue-and-groove stock.

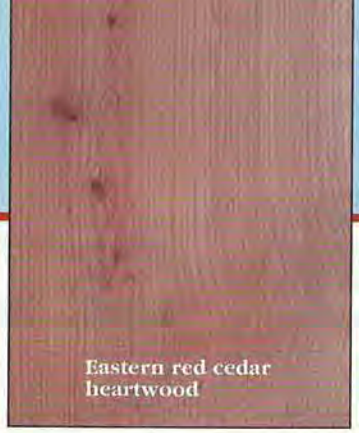
Continued

PERFORMANCE PROFILE

eastern red cedar

(Juniperus virginiana)


Eastern red cedar with sapwood


Eastern red cedar heartwood

Because the days of long, wide, and clear boards of eastern red cedar have long passed, you'll have to make due with knottier stock of smaller dimensions. That means that you must carefully select your wood, looking for boards with tight knots that won't fall out when machined. Avoid, too, those boards showing surface checking—the result of hurried seasoning. Otherwise, eastern red cedar shouldn't give you any working problems. Just remember the following tips.

Machining methods

Eastern red cedar works great with hand or power tools, but the fairly brittle wood does tend to tear a bit, especially around knots, so keep all your cutting edges sharp.

- Always feed boards into a power planer at a slight angle to minimize tearing and chipout.
- Lighter passes when removing wood during planing or shaping with a router also will help you avoid chipping.
- Don't fail to use a backing board when drilling.
- Because the wood also tends to split, be sure to predrill for nails and screws.
- All types of adhesives work well on eastern red cedar if you remember to first wipe joining surfaces with acetone or lacquer thinner to remove natural oils.
- To retain the fragrance of eastern red cedar when used in projects such as chests, don't finish the wood on interior surfaces. And remember that you can revive the fading aroma of old wood by sanding lightly to bring inner oils to the surface.
- Never use polyurethane and plastic finishes on eastern red cedar because the same oil that makes it fragrant also resists their adherence and they'll eventually peel off.

Carving comments

Due to its softness, eastern red cedar lends itself to carving as well as it did to the pencil industry. However, you'll have to make do with small pieces to avoid knots. Then, keep these tips in mind:

- Use caution when taking deep cuts in straight grain, as the wood may tear or pop out.
- Avoid carving tiny details. The wood may not be hard enough to hold them.

Turning tricks

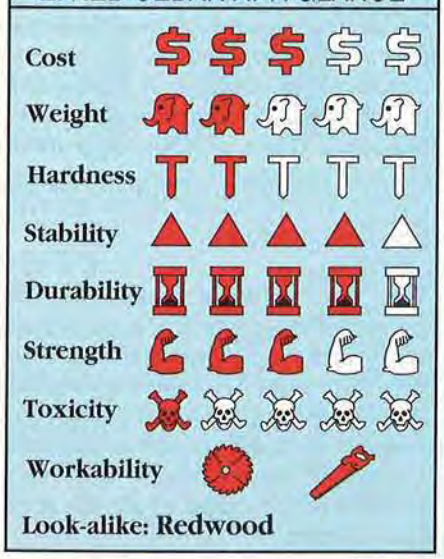
In Tennessee and parts of Arkansas where the tree grows in abundance, craftsmen turn novelties from eastern red cedar. But they avoid knotty wood and they keep cutting edges sharply honed to avoid tearout.

SHOP-TESTED TECHNIQUES THAT ALWAYS WORK

Any exceptions—and special tips pertaining to this issue's featured wood species—appear under other headings elsewhere on this page.

- For stability in use, always work wood with a maximum moisture content of 8 percent.
- Feed straight-grained wood into planer knives at no angle. To avoid tearing, feed boards with figured or twisted grain at a slight angle (about 15 degrees) and take shallow cuts of about 1/32".
- For clean cuts, rip with a rip-profile blade with 24-32 teeth. Smooth crosscutting requires at least a 40-tooth blade.
- Avoid drilling with twist drills. They tend to wander and caus breakout.Use a backing board under the workpiece.
- Drill pilot holes for screws.
- Rout with sharp, preferably carbide-tipped, bits and take light, shallow passes to avoid burning the wood.
- Carving a softwood generally-means fairly steep gouge bevels—greater than 20 degrees—and deeper cuts.

E. RED CEDAR AT A GLANCE



Compiled with woodworkers Jim Boelling and Jim Watson Illustrations: Steve Schindler

In retirement, Illinoisan George Goatey has loads of fun adding personality to the basic box

CASES TO CATCH A CRAFTSMAN'S FANCY

With a grin spreading across his neatly bearded face, George Goatey says "I'm having so much fun, I hope that I'm lucky enough to have it last 35 years, just like my job did!" And he isn't kidding.

Ever since his retirement five years ago from the St. Louis-based Union Electric Company where he was a service manager, George, 63, has busied his days with basswood. From the spacious walkout basement shop at his home in Columbia, Illinois, he's turned out everything from caricature carvings to ones in an old-world Santa style, and lots of gorgeous, hand-crafted boxes. In fact, George often becomes so involved in his work that his wife, Marlene, gets worried by the silence and has to check on

Continued

In his fifth year of retirement, craftsman George Goatey feels that he has never been busier—or happier. George builds special boxes for collectors who specialize, and his own carving box featuring relief-carved tools is no exception.

Print this article

Switching from carving to the joinery involved with dovetails provides George with the variety that he enjoys.

him. "Yeah," he chuckles, "sometimes I'll get going on a carving, and before I know it, seven or eight hours have gone by without my making a sound except the slicing of wood, and she can't hear that upstairs."

Containers for the connoisseurs of collectibles

An enthusiastic collector of hand tools, Civil-War era sewing machines, cast-iron lawn sprinklers, and Victorian pencil sharpeners, George caters his carved boxes to other such specialty collectors. "Of course, you know that people collect practically anything," he comments, glancing quickly at his carving-tool rack which is chock full of gouges, knives, chisels, and other implements of his craft that he has accumulated since he started carving eight years ago.

"Well, I got to thinking, 'What if I made special boxes to hold those things that people treasure, like pocket watches?'" And as George's large inventory attests, he made the right decision and will sell plenty of them this year.

Priced between $175 and $400, his carved boxes inform at a glance just whom and what they're destined for. For the pocket-watch collector, there's one emblazoned with a carved watch on the lid. Inside, George has customized a tray to show off an array of handsome timepieces.

A collector of leather-working tools would lean toward the chest bearing likenesses of those instruments. The cabinetmaker, or lover of the tools of that trade, would prefer a box featuring measuring devices and a mitersaw.

George sees to it that others' interests won't go unsatisfied, too. That's why he crafts boxes with carved sunflowers, ones with oak leaves and acorns, or cattails, and even Christmas boxes bedecked with basswood bows, ribbons, and tiny Santas. George also accepts commissions for specific designs.

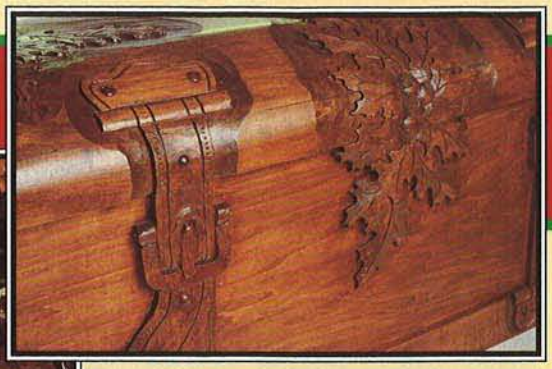
Then, too, there are those who have even started collecting the boxes. "I have people from several years ago, when I sold at my very first show, call me up to order another one. So I guess they can be collected," he points out with just pride.

Yet, although the boxes alone would be enough to sell, appealing as they do to happy customers with bountiful billfolds, George has developed a mixed-marketing strategy. He mingles the carved boxes with old-world Santas of all conceivable sizes and shapes, and relief-carved Christmas pendants and ornaments. "All I try to do is keep my carving paying for itself," explains George, "but I don't want to get tired of doing it, either. This way, when I start to get fed up with Santas or ornaments, I move to a box for a change of pace."

Why the box must always fit the board

George isn't at all consistent when it comes to building lids for his boxes, or with what hardware he attaches it to the box carcass. "I make some lids with lips, like a Roman ogee," he says. "On others, I wrap the carving on the lid right over onto the front of the box so that people really have to explore how it opens. I just do whatever seems right to me, even down to the hinges. I'll use different types and sizes—but all the same on any one."

When it comes to boards and boxes, however, the bewhiskered craftsman only goes one way. "I always make the box to fit the board, rather than the board to fit



Above: **George accents his finely crafted boxes with carvings that often flow over the lid, such as this strap hinge.**

Top left: **This basswood creation has already caught the eye of a timepiece connoisseur. The inner tray neatly cradles ten pocket watches.**

Middle left: **A box destined for a cabinetmaker has an overhanging lid, one of several lid designs George uses. Note the carved hand-plane handles.**

Bottom left: **Flowing the lid carving over onto the front of the box requires exact measurement as well as skill.**

the box," he says firmly. The reason? It's not because George fears edge-to-edge gluing, joint failure, or wood movement, but instead, staining. "You see, with basswood, at least the locally grown basswood I get from my supplier over in Peron [Illinois], each board seems to take the stain differently. A box made up of wood from different boards could end up looking blotchy," he says.

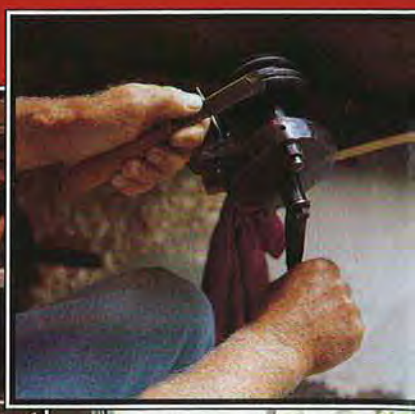
"That's why I prefer to make the box to fit the board I have on hand." he continues. "And I'm talking a board wide enough to do the top as well as the sides and bottom without edgejoining—say nine to fourteen inches. And it has to be long enough to wrap around. I guess you could say that I wrap the board around the box!"

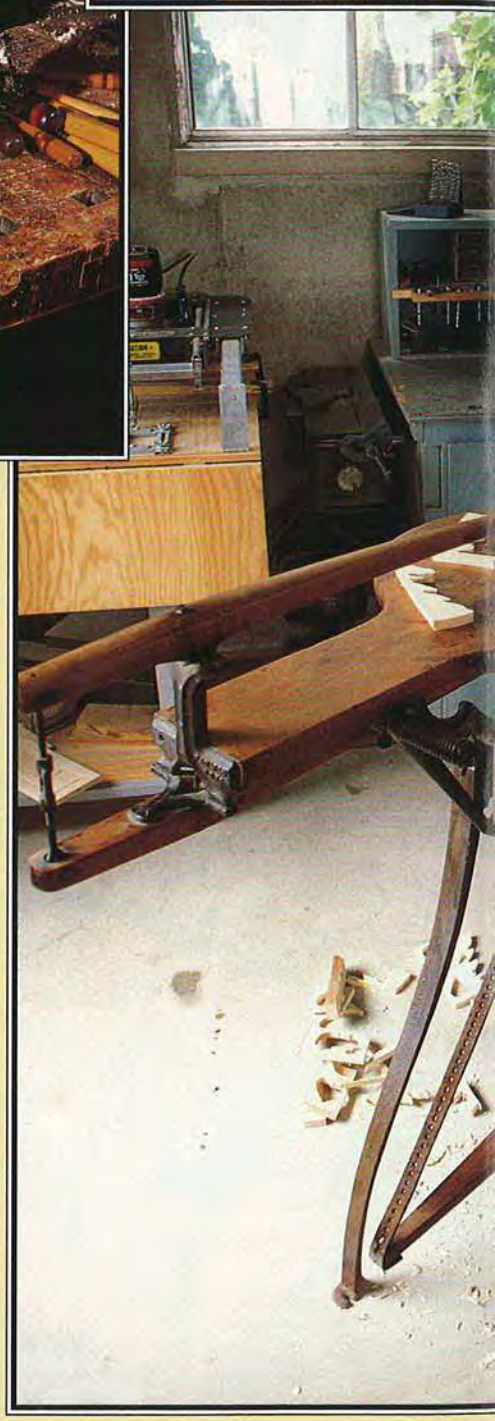
The many fine details of hand-craftsmanship

Like most other woodworkers in these days of reliable power tools, George relies on a planer and a table saw to machine his boards to size. But when it comes to joining, this craftsman sticks strictly to hand tools.

"I've always admired hand-cut dovetails, so that's how I assemble my boxes. But I'm not inhibited by any rules over making them.

Continued





Above: **George's Santas come in all shapes and sizes, and even appear as decoration on his elaborate Christmas boxes along with festive ribbons and evergreen trees.**

And my customers appreciate the look, too." says George, placing his brass-trimmed backsaw on the end of a board. "Cutting them is easy enough, it's only the laying out that's a little difficult."

With his saw, George deftly follows the penciled lines that outline his dovetails on the board. "It's these details, even if folks don't know how they're made, that make the boxes special," he comments. "Even when they're not perfect, they complement the carving. And I've seen boxes made 100 years ago with dovetails just like mine that have stood the test of time."

Hand-cut dovetails undoubtedly add to the attraction people have for George's boxes. But matched to another detail—the handles—they pale in comparison. He really knows how to handle a handle.

"If there's a subject that's appropriate for a handle—I mean that fits—I'll carve it for that purpose, then glue and screw it to the box," he explains. And what is an appropriate shape? Try spokeshaves, planes, marking gauges for tool boxes. An enlarged sunflower bloom or a cattail works well on boxes destined for a living room or bedroom. On a Christmas box, *above*, look for a Santa.

Yesterday's tools that still work today

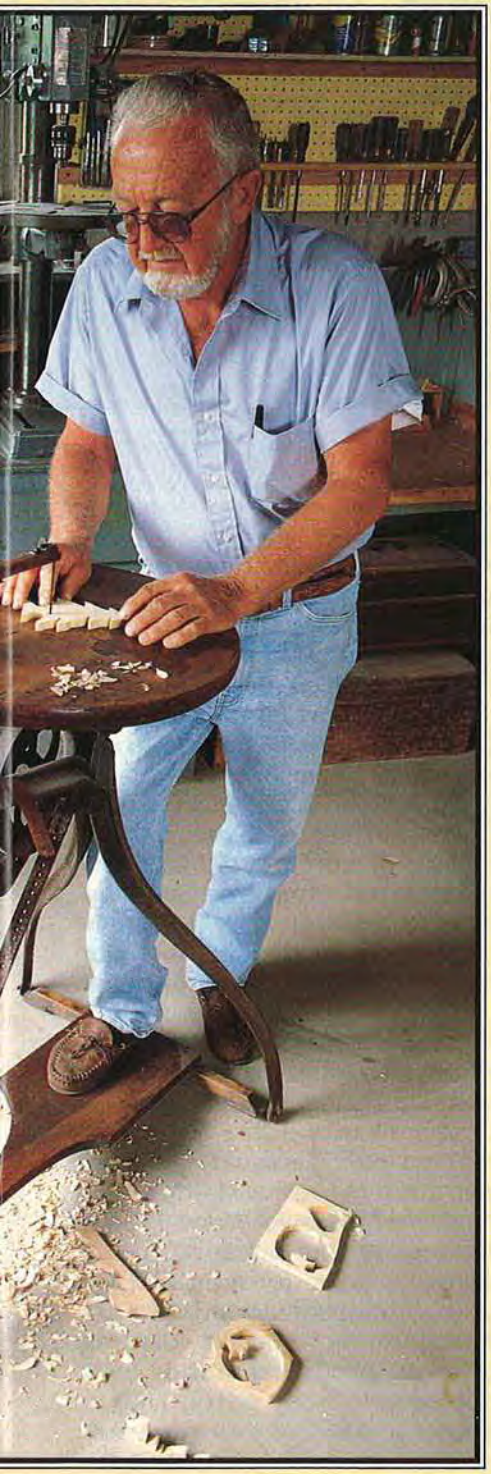
George began collecting woodworking tools long before he became a full-time woodworker. Back in the early 1970s he learned about the joinery—and tools—of yesteryear when he and his wife owned an antique shop.

"If I had a repair to do, such as a broken part on an old chair, I couldn't use modern tools on it. The part had to match, so I used hand tools, ones that I picked up here and there at a sale or auction. I mostly hung on to them, too, and rely on many to this day."

Roaming two of the rooms that house George's collectibles, he points out old plow and molding planes, saws, and cooper's tools

Left: **Frequently honing gouges at his hand-cranked leather wheel keeps a tool's edge in shape for 50 carvings or more.**

Below: **George's vintage 1880 Barnes' treadle scrollsaw sees use at crafts fairs.**



in one. In the other, there's a peddle-powered scrollsaw and a foot-operated honing wheel in front of a case filled with pencil sharpeners from the late 1800s.

"When Marlene and I go to a crafts show, I usually take the scrollsaw and the wheel," says George, "just because people enjoy seeing them work." But machines such as these aren't exclusively for demonstration—there's a matching pair in the shop that see regular use. There, in an open area near his workbench, George demonstrates, as shown *left*.

"None of my basswood scrap goes to waste,'' he says, as his hands skillfully maneuver a piece of wood against the blade's up and down motion. His foot thumps a practiced rhythm on the treadle. "And it's kinda fun cutting out ornament and necklace blanks the old way on this Barnes machine." For George, pedaling only provides a change of pace. His electric scrollsaw as well as the bandsaw see regular use.

To hone his carving tools, non-electric power also has a place. He proves it seated at his workbench, *top*. "I made this hand-crank honing wheel," says George. "It turns like an old pencil sharpener. I can hone gouges and V-tools on the thick leather wheel. You see, the tool's shape gets worn on the leather so that the tool tips fit in perfectly. With this, I can carve maybe fifty Santas before I have to redo the edge. I hone when the tool isn't sliding through the wood."

Two tools on George's "favorite" list receive regular honing. "I wish I could find more tools like these," says George as he fondles the handles of a pair of gouges. "The handles are of laminated rosewood and beech, and the steel was made in Sheffield, England. It really takes and holds an edge, even compared to today's steel from the same place. How much did I pay for them? Two bucks each at a flea market!"

Never remove a tool stroke

Sure, George sands his work—but only the flat surfaces. "I like to see tool marks on the carvings. If the tool's edge was sharp, these marks appear smooth, clean, and honest," he says. To the touch, his boxes defend his statement. Handling them, they feel like sculpted marble, yet with the warmth of wood. There's good reason for it, besides sharp tools.

"I mix my own blends of Minwax oil stains to get the shade I want," George notes. "Then I stain and let the wood dry thoroughly before I do any painting. When I'm ready to paint, I add any color with acrylics. Using oil stain first controls bleeding into the grain from the water-based paints."

When all has sufficiently dried, George sprays on three coats of Deft lacquer, rubbing between coats with extra-fine steel wool to smooth out the finish. "The finish not only must protect the wood, but hold up to handling," explains the carver. "I rub it down to knock the gloss, but leave as much thickness as I can."

So it goes, from carving and joinery to finishing, collecting, and crafts fairs. A pretty hectic life for a retiree? "Absolutely not!" says George: "After five years, it still feels like I'm on vacation."

Have gouges, will travel

George Goatey teaches carving seminars at Belleville, Illinois, and at other locations in the greater St. Louis area. He and Marlene also travel to a half-dozen or so crafts shows a year. *For more information, write to George at* :
818 South Rapp St., Columbia, IL 62236.

Written by Peter J. Stephano Photographs: Todd V. Phillips

The cover-up specialists Print this article

WOOD PUTTIES

Let's face it: From time to time we all need to use a dab or two of wood putty to cover up our woodworking imperfections. And when you do, it helps to know that you have a wood putty that will perform up to your expectations. To help you find the right product, we recently tested 10 widely available wood putties (and a homemade concoction). Here's what we discovered:

You can choose from these types

As with most wood-finishing products, advances in chemistry help make possible the continual introduction of new wood putties. To help you sort through today's choices, we'll talk a bit about five basic categories:

•**Solvent-based putties.** These products contain powerful solvents such as acetone and alcohol that give off strong odors and make them extremely flammable. These solvents also help give the products excellent performance characteristics such as quick drying and low shrinkage.

Most companies with products in this category offer you a wide variety of colors at a reasonable price. Although we give a slight edge to Famowood Woody Putty, we found little in the way of performance or price that separates these products.

•**Water-based putties.** These relatively new products offer you a low-odor, nonflammable option in exchange for lower performance in most areas (see chart at *right*). In our tests, 3M Just Like Wood Wood Putty performed best, but it was also the most expensive. It's a smart choice if you don't go through lots of putty.

•**Powders.** With these products you have nearly unlimited shelf life, but you need to mix them with a liquid prior to use (a hassle if you only need a small amount). The Bix Stain Putty performed on a par with the premixed products in our test, and you can mix it with water, stain, or solvent to make it behave like a water- or solvent-based product.

The other item in this group, Durham's Water Putty, can be mixed only with water or water-based paints or stains. Although it did not perform as well as many of the other tested products, its low price makes it suitable for painted projects that require lots of putty.

•**Two-part formula.** Only one product in our test—Minwax High Performance Wood Filler—belongs in this category. It consists of a polyester resin that you mix with a hardener prior to use. Except for its wood-like color, the Minwax product reminds us of automotive body putty. Like an epoxy, it does not shrink or crack.

A word about packaging

Most wood putties come in metal cans, plastic tubs, or squeeze tubes as shown in the photo *below*. We found the squeeze tubes the most convenient to use.

The metal cans required the greatest effort, and most of the fast-drying, solvent-based products come in metal cans. With these you need to be careful to tightly seal the can, and turn it lid-down during storage to prevent the putty from drying out.

HOW TO CHOOSE THE RIGHT ONE WHEN YOU HAVE SOMETHING TO HIDE

WOOD PUTTIES PUT TO THE TEST

MANUFACTURER/PRODUCT	TYPE (1)	AVAILABLE COLORS (2)	MIXING REQUIRED (YES, NO)	CLEANUP (3)	PERFORMANCE EVALUATION (4) ODOR (5)	WORKING TIME (6)	DRYING TIME (7)	SHRINKAGE AND CRACKING	SANDING EFFORT REQUIRED	SANDPAPER CLOGGING	ADHESION TO REPAIRED SURFACE	SCREW-HOLDING ABILITY	TAKES STAIN EVENLY (YES, NO)	PRICE (8)
BIX STAIN PUTTY	P	1*	Y	S/W	E*	E	G*	G	E	E	E	E	G	$2.29 (7 oz.)
DAP WOOD DOUGH	S	9	N	S	P	F	G	E	F	G	E	E	E	1.99 (4 oz.)
DURHAM'S ROCK-HARD WATER PUTTY	P	1*	Y	W	E	G	E	G	G	G	P	F	P	1.29 (16 oz.)
ELMER'S PROFESSIONAL CARPENTER'S WOOD FILLER	W	1	N	W	E	G	G	F	G	F	P	G	G	2.85 (8 oz.)
FIX WOOD PATCH	S	12	N	S	P	F	G	E	F	E	E	E	E	2.29 (4 oz.)
FAMOWOOD WOODY PUTTY	S	18	N	S	P	F	G	E	E	G	E	E	E	2.39 (6 oz.)
FRANKLIN MENDWOOD WOOD FILLER	W	1	N	W	E	G	G	F	E	G	P	P	G	1.99 (4 oz.)
MINWAX HIGH-PERFORMANCE WOOD FILLER	T	1	Y	S	F	E	E**	E	F	F	E	E	E	7.99 (6 oz.)
PLASTIC WOOD	S	5	N	S	P	F	G	E	E	F	E	E	E	2.89 (5 oz.)
SAWDUST AND WOODWORKER'S GLUE (HOMEMADE)	H	**	Y	W	E	G	F	F	G	F	E	E	F	2.70 (8 oz.)*
3M JUST LIKE WOOD WOOD PUTTY	W	1*	N	W	E	E	F	G	G	E	E	E	G	4.29 (3.5 oz.)

NOTES:

1. (H) Homemade
   (P) Powdered
   (S) Solvent-based
   (T) Two-part polyester
   (W) Water-based
2. (*) Product container states that you can mix stains and/or paints with product prior to application.
   (**) Color varies according to type of sawdust used.
3. (S) Solvent cleanup
   (S/W) Solvent or water cleanup depending on what you mix
   (W) Water cleanup
4. E Excellent
   G Good
   F Fair
   P Poor
5. * Varies depending on whether you mix product with water- or solvent-based solution.
6. E 2-4 minutes
   G 1-2 minutes
   F 30-60 seconds
   Working time will vary depending on amount applied, room temperature, and humidity.
7. E 15-20 minutes
   G 20-30 minutes
   F 30-50 minutes
   * Varies depending on whether you mix product with water- or solvent-based solution.
   ** Product doesn't dry, it cures.
8. Price we paid at local hardware stores.

Although high-priced, it gave the most permanent repair of any tested product. We found it difficult to stain or sand, and mixing it in small quantities was a chore.

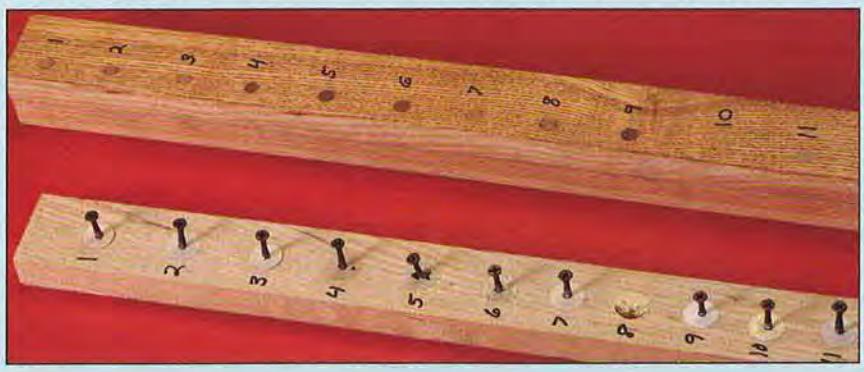
•The homemade alternative. Before the days of commercially made wood putties, woodworkers mixed fine sawdust with glue to fill imperfections. Today, this option still makes sense at times.

Since you use sawdust from the project at hand, you get a good color match without staining. However, applying this mixture properly can be tricky, and once dry it tends to load sandpaper.

Written by Bill Krier
Product testing: Dave Henderson

How we tested the putties

To arrive at the results presented in the chart *above,* we put our sample putties through a variety of tests. Using numbered hardwood sticks such as those shown *below*, we applied the putty into ½"-diameter holes. We observed the odor, working and drying time, shrinkage, sandability, and stain acceptance of each product. We also drilled pilot holes into each plug and drove screws into them to test the adhesion and screw-holding properties of the putties.



SO SIMPLE, YOU WON'T BELIEVE IT!

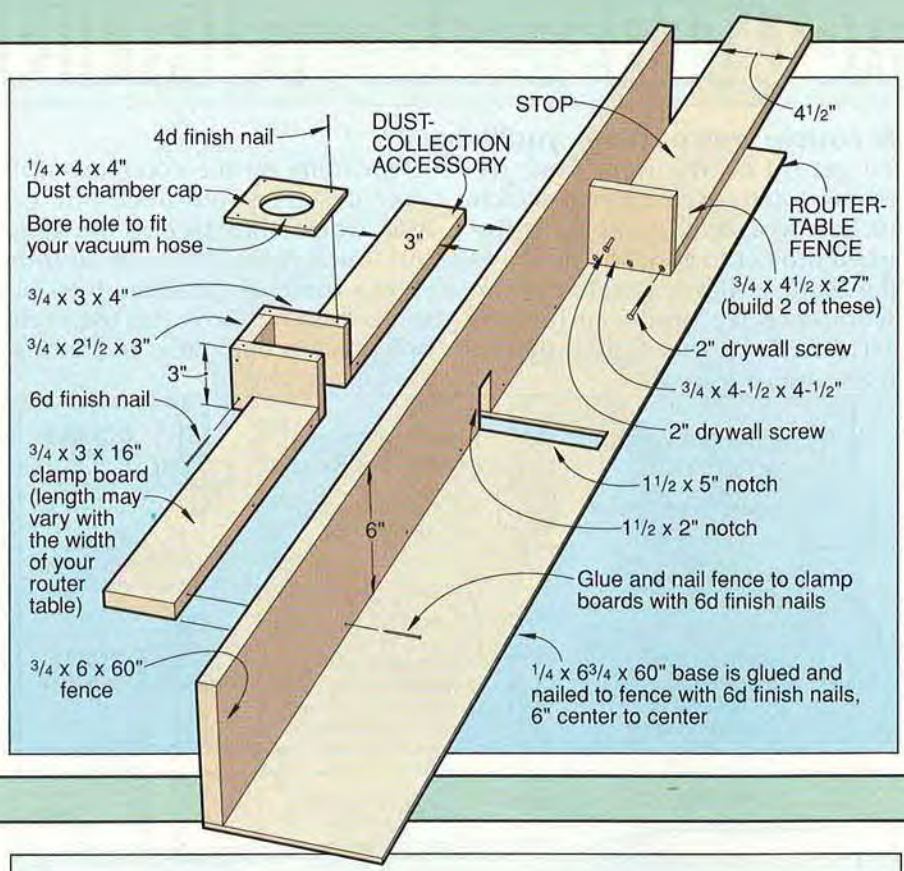
ROUTER-TABLE TURNING

Some reader letters really grab our attention, such as the one we received from John Grant of Palmer, Alaska. It began, "You're not going to believe what I am about to tell you. I know how to taper a round table leg on my router table using only a straight bit." John went on to describe his easy-to-do process for attaching wooden discs to both ends of a piece of stock, then rotating the stock over a spinning straight bit to make it round.

After reading his letter, we tried his procedures in the *WOOD*® magazine shop. They worked like a charm! Before too long, we found ways to produce flutes, coves, and beads, too. The results were truly impressive. Now, we're ready to introduce you to these incredibly simple and accurate techniques.

You'll need this simple fence system

To get things under way, build the router-table fence, stops, and dust-collection accessory as shown *right*. The 6"-high fence works with turnings that have round or multi-sided discs up to 12" in diameter. These discs mount to the ends of the workpiece and support it as you slide or rotate the workpiece along the fence as shown *left*.

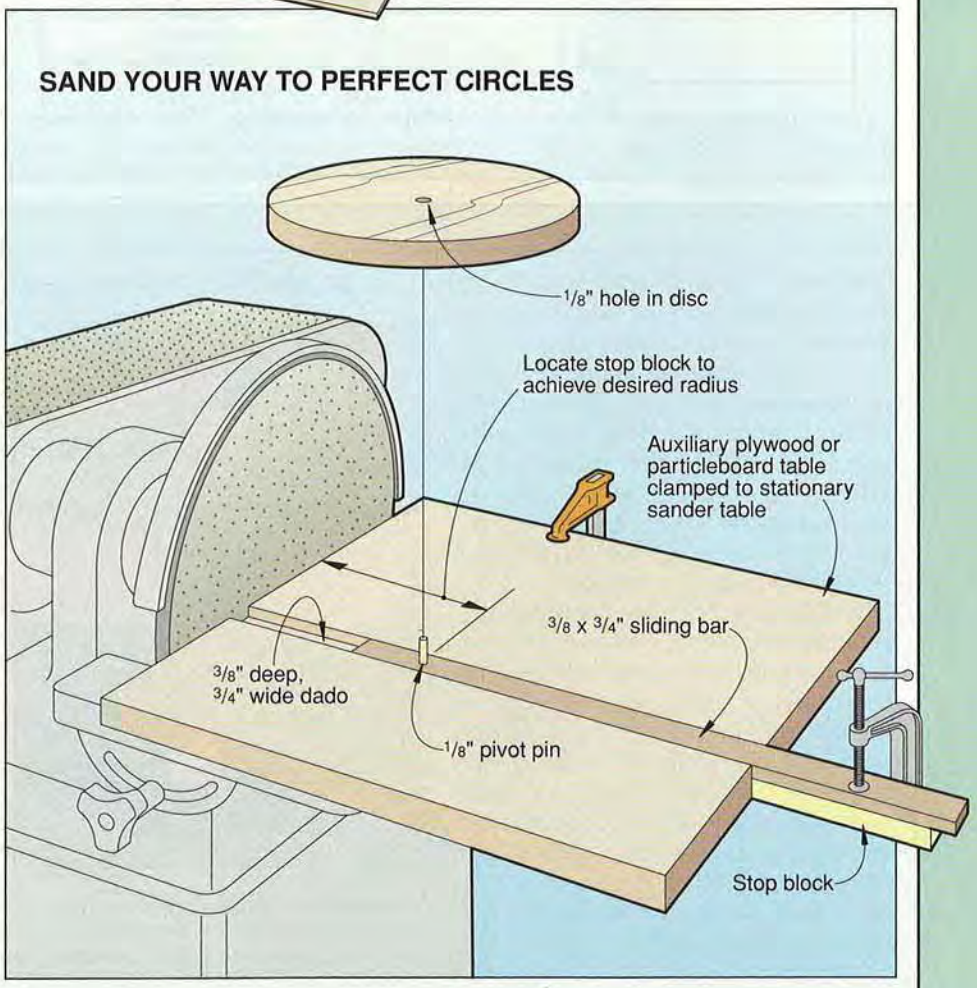

4d finish nail
DUST-COLLECTION ACCESSORY
STOP
4½"
¼ x 4 x 4" Dust chamber cap
Bore hole to fit your vacuum hose
3"
ROUTER-TABLE FENCE
¾ x 3 x 4"
¾ x 4½ x 27" (build 2 of these)
¾ x 2½ x 3"
3"
2" drywall screw
6d finish nail
¾ x 4-½ x 4-½"
2" drywall screw
¾ x 3 x 16" clamp board (length may vary with the width of your router table)
1½ x 5" notch
1½ x 2" notch
6"
Glue and nail fence to clamp boards with 6d finish nails
¾ x 6 x 60" fence
¼ x 6¾ x 60" base is glued and nailed to fence with 6d finish nails, 6" center to center

Discs: the key ingredient

Just as lathe-turned workpieces rotate against a cutter as they take on a rounded shape, so do router-turned objects. The low-tech solution for rotating router-turned objects: round wooden discs screwed on center to both ends of the workpiece.

To make the discs, first measure diagonally (corner to opposite corner) on the end grain of your workpiece. Add ¼" to this measurement, and with a compass draw a circle of this diameter onto a piece of ¾"-thick stock. Bandsaw the disc roughly to shape, staying just outside the marked line. Drill a ⅛" hole through the center of the disc.

For router-table turning to work well, you must create perfect circles. Fortunately, this is easy to do. Simply make a disc-sanding jig like the one shown *right*. Place the hole of the disc onto the pivot pin and slowly advance the disc into the sander. Set the stopblock when the sanding surface removes stock up to the compass-made layout line. Slowly rotate the wheel to make it circular.


SAND YOUR WAY TO PERFECT CIRCLES
⅛" hole in disc
Locate stop block to achieve desired radius
Auxiliary plywood or particleboard table clamped to stationary sander table
⅜ x ¾" sliding bar
⅜" deep, ¾" wide dado
⅛" pivot pin
Stop block

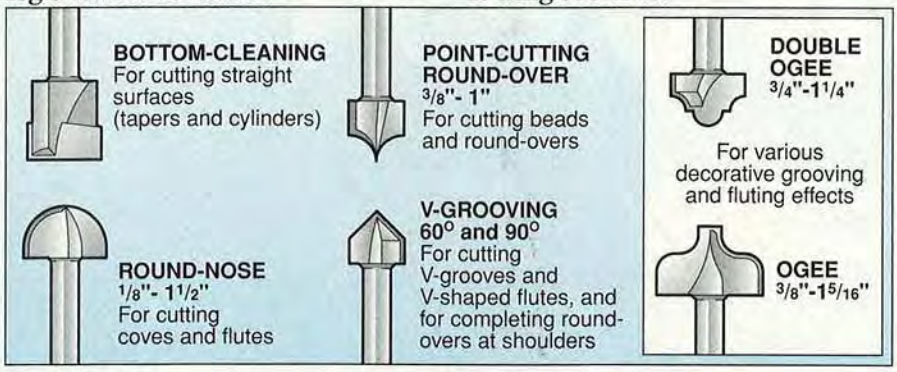
Continued

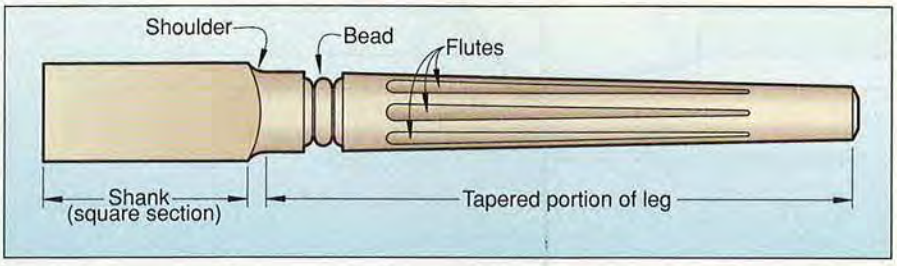
ROUTER-TABLE TURNING

A couple more things you'll need

To get off on the right foot, we advise you to draw a rough sketch of how you would like your finished project to appear. The drawing *bottom* shows a sketch of the workpiece we produced for this article. Note the names of the leg's various features.

Depending on the complexity of your design, you'll need one or more router bits to execute various cuts. The drawing *below* shows some of the basic bits for router turning. How you use each one will become clear in the following sections.





Try your hand at a simple cylinder

After drawing diagonal lines on the ends of your workpiece, mark the centerpoint of each with an awl. Then, center and fasten a disc to each end of your workpiece with 1½" drywall screws as shown *right*. Check to make sure that no part of your workpiece extends past the rims of the discs.

Now, position your workpiece, fence, and stops as shown *right*. A straight bit works for this task, but we found that a bottom-cleaning bit (also referred to as a surface-planing bit) produces an even smoother cut. (See our Buying Guide on the final page of this article for a source.)

Note: *No matter what cut you make, remember to always center the router bit directly under the workpiece.*

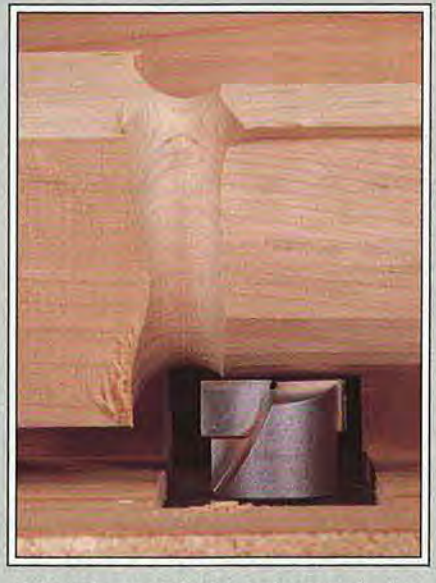
To make your first cut, turn the router on and slowly lower the left end of the workpiece onto the router bit (with the right-side disc in contact with the stop screw on the right-side stop).

These simple changes will help you produce a tapered leg

First, mount discs of equal size to your workpiece just as described earlier for making cylinders. With a round-nose bit, cut a groove that defines the area where the top of the taper meets the shoulder as shown *right*. Make these cuts in several passes, remembering to always rotate the bottom of the workpiece into the fence.

Switch to a bottom-cleaning bit, readjust the stops, and turn the leg to a cylinder as shown in Step 1 of the drawing *right*. Cut the cylinder no deeper than the bottom of the rounded groove at the base of the shoulder. Follow steps 2 and 3 of the same drawing to determine the size of the smaller disc at the narrow end of the taper. Mount the smaller disc and taper the leg using the same method for making a cylinder.

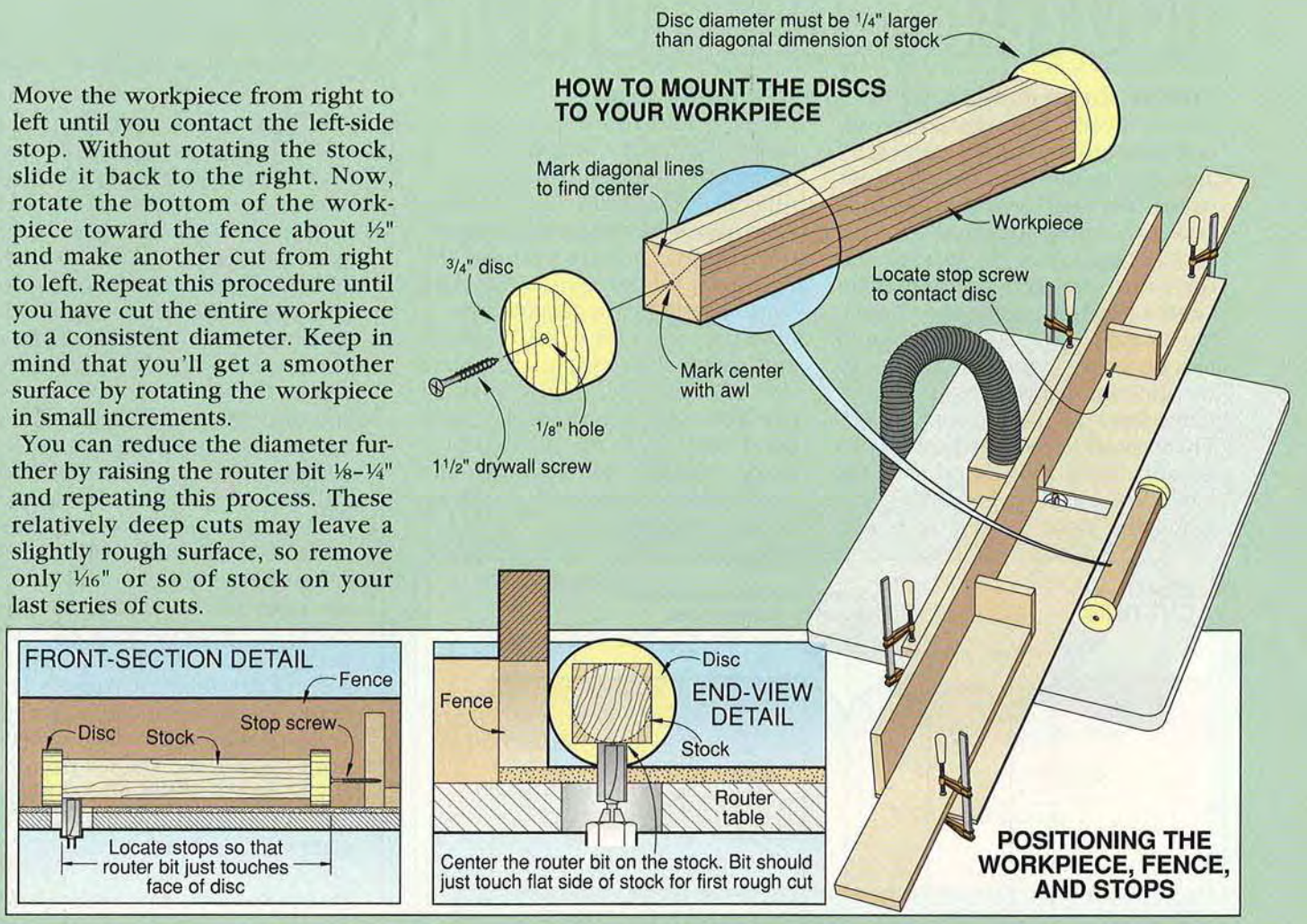
A round-nose bit cuts the shoulder that separates the shank from the tapered portion. Make the cut in several light passes to prevent splintering.



Although straight bits also work, bottom-cleaning bits such as this one work best for cutting flat surfaces. from the shank to the shoulder

Move the workpiece from right to left until you contact the left-side stop. Without rotating the stock, slide it back to the right. Now, rotate the bottom of the workpiece toward the fence about ½" and make another cut from right to left. Repeat this procedure until you have cut the entire workpiece to a consistent diameter. Keep in mind that you'll get a smoother surface by rotating the workpiece in small increments.

You can reduce the diameter further by raising the router bit ⅛–¼" and repeating this process. These relatively deep cuts may leave a slightly rough surface, so remove only 1/16" or so of stock on your last series of cuts.


Disc diameter must be 1/4" larger than diagonal dimension of stock
HOW TO MOUNT THE DISCS TO YOUR WORKPIECE
Mark diagonal lines to find center
Workpiece
3/4" disc
Locate stop screw to contact disc
Mark center with awl
1/8" hole
1 1/2" drywall screw
FRONT-SECTION DETAIL
Fence
Disc
Stock
Stop screw
Locate stops so that router bit just touches face of disc
Disc
Fence
END-VIEW DETAIL
Stock
Router table
Center the router bit on the stock. Bit should just touch flat side of stock for first rough cut
POSITIONING THE WORKPIECE, FENCE, AND STOPS

STEP 1: Turn leg straight using equal sized discs
STEP 2: Determine the amount of reduction in diameter desired in leg
STEP 3: Reduce diameter of disc by same amount
TURNING A TAPERED LEG

Finally, use a V-grooving bit to smooth the transition from the shoulder to the shank as shown in the photo *below*. Take light, controlled cuts to prevent grain tear-out and chipping.

Continued

With discs of different sizes you can create tapered workpieces.

V-grooving bits cut a smooth transition from the shank to the shoulder

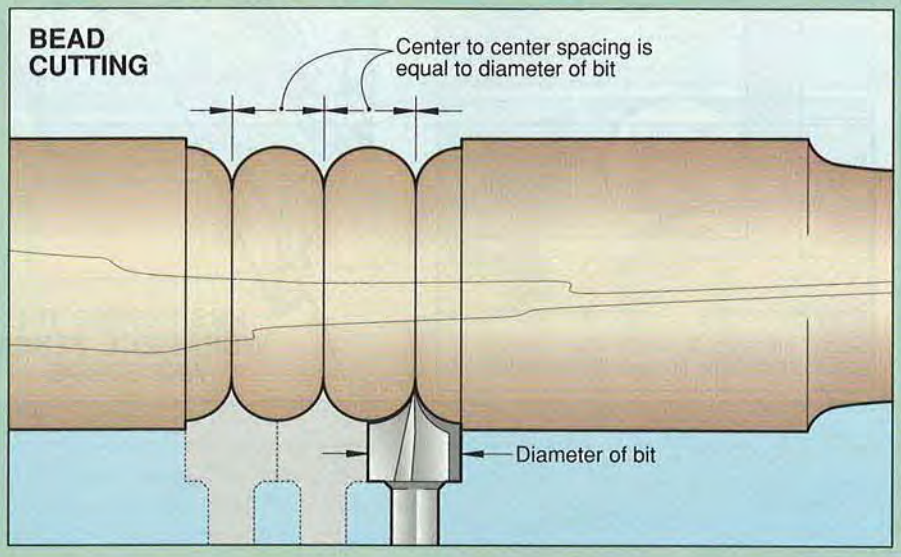
ROUTER-TABLE TURNING

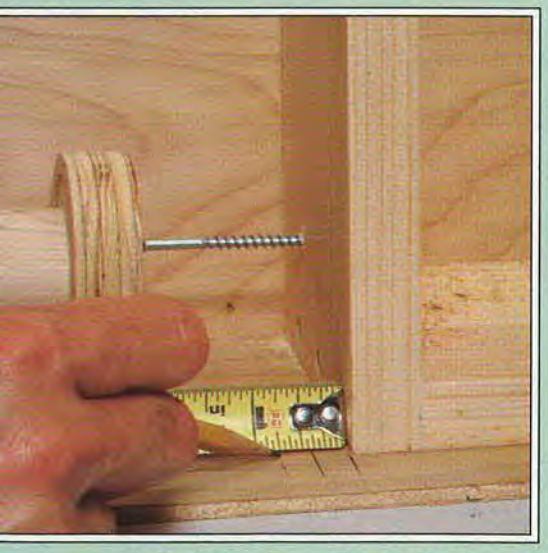
Follow these easy steps for great-looking beads

To cut beads, you need a point-cutting round-over bit, generally available in ⅜–1" diameters. Your beads will look perfect as long as you space them accurately.

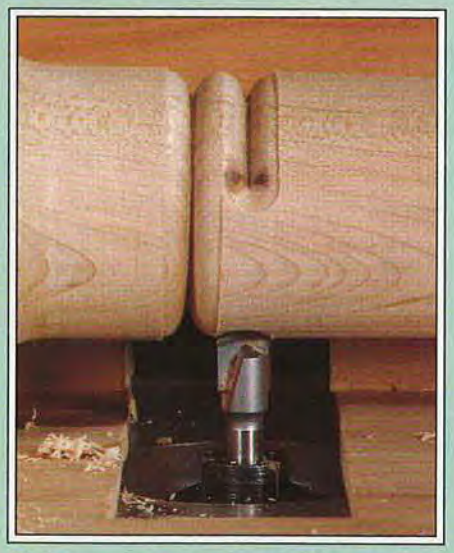
As shown *below*, the diameter of the bit determines the center-to-center bead spacing. After deciding how many beads you would like on your project, simply transfer spacing marks to your router-fence base as shown *bottom left*. These marks tell you how far to advance your right hand stop for each successive beading cut. Once the right hand stop is set, snug the lefthand stop so that the stopscrew touches the disc.

Adjust the router bit so it makes a full cut. Turn the router on and hold the left-hand wheel above the router table as you set the righthand wheel against the right stop. Slowly lower the workpiece onto the router bit to start the cut, and rotate the stock to complete the beading cut. Before making the next cut, advance the right-hand stop up to the next spacing mark, readjust the left stop, and make your second cut as shown *bottom right*.





Mark the bead spacing on the base of the router-turning fence.



Point-cutting round-over bits produce perfectly shaped beads.

Add a classical touch with flutes

By replacing the discs on both ends of your workpiece with flat-sided shapes such as hexagons, you can rout flutes into the cylindrical or tapered sections of your project. On a cylindrical workpiece the flutes will be a consistent depth over their entire length. But, on tapered legs the flutes will decrease in depth over the length of the leg until they disappear, as shown in the opening photo of this article.

The number of flutes will be the same as the number of flat surfaces on the shapes you attach to the ends of the workpiece. For example, hexagon ends will help you produce workpieces with six evenly spaced flutes. The drawings *right* will help you lay out hexagon and octagon discs. After cutting the shapes from ¾" stock, attach them with drywall screws so that the flat surfaces align with each other.

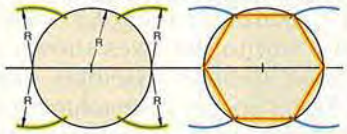
Note: *You must exactly center the discs on the workpieces. Otherwise, your flutes will not be consistent in depth.*

To align the flat surfaces of the shapes, set the workpiece on a flat surface as you tighten the screws as shown *below*. Then, add an off-center screw to each end to keep the multi-sided ends from rotating.

Discs with flat sides will help you cut evenly spaced flutes of varying numbers.

To cut the flutes, set your stops for the length and positioning of the flutes on the workpiece. Hold the left end of the workpiece above the router table, and place the right-hand shape against the right-hand stop with a flat side of the shape lying flat on the router table. Lower the left end of the workpiece onto the router bit and feed the stock from right to left. Lift the workpiece up after you cut each flute, rotate it for the next cut, and repeat this procedure.

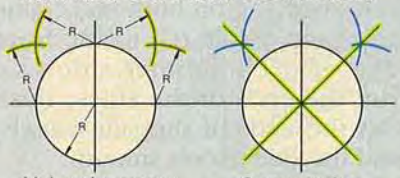
LAYING OUT A HEXAGON



Using the same radius as the circle, strike four arcs as shown.

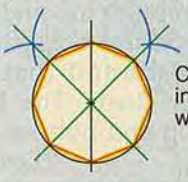
Connect the intersections as shown

LAYING OUT AN OCTAGON

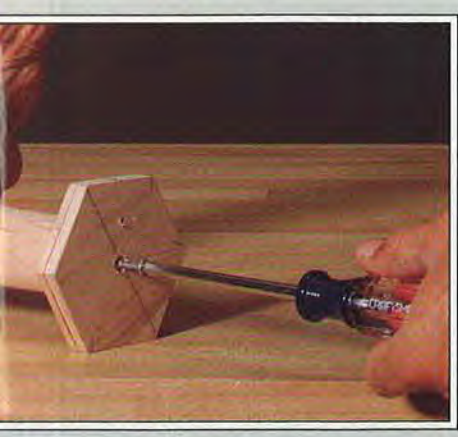


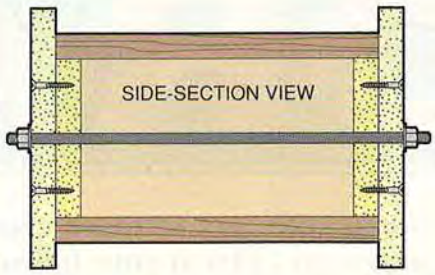
Using the same radius as the circle, strike four arcs as shown

Connect the intersection of the arcs with the center of the circle



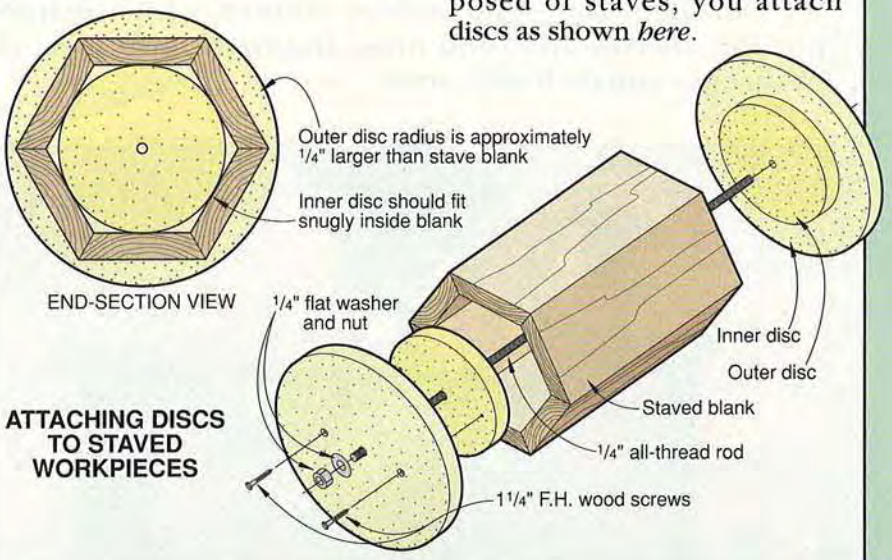
Connect the intersections with the circle





Large workpieces work well, too

You can apply the techniques in this article to large objects such as pedestal columns or the cookie jar on *page 70*. You just need to make a few accommodations. For long projects you need to lengthen the fence. For large-diameter workpieces composed of staves, you attach discs as shown *here*.


Outer disc radius is approximately 1/4" larger than stave blank
Inner disc should fit snugly inside blank
END-SECTION VIEW
1/4" flat washer and nut
Inner disc
Outer disc
Staved blank
1/4" all-thread rod
1 1/4" F.H. wood screws

ATTACHING DISCS TO STAVED WORKPIECES

With a large fence you can even produce large-diameter workpieces.

Final touches

Although your flutes and beads will come out pretty smooth, you'll have to sand the cylindrical and tapered portions of your workpieces. We suggest you remove small ridges and wood-grain fuzz with 80- or 100-grit sandpaper. Do the final smoothing work through a succession of 150- and 220-grit abrasives.

Buying Guide

Bottom-cleaning router bits, as well as any other bit used in this article. Eagle America, 117 South St., P.O. Box 1099, Chardon, OH 44024. Call 800/872-2511.

Written by Bill Krier with Jim Downing
Illustrations: Kim Downing
Photographs: John Hetherington

Print this article

STYLISH STORAGE

Looking for a way to make some order out of those ever-growing stacks of cassettes, tapes, and CDs at your house? We can help. Our solid walnut cabinet, which features pull-out shelves and solid brass hardware, will meet the challenge—and do it with style.

Start with the basic cabinet

1 Cut the cabinet sides (A) and top and bottom (B) ¼" wider and 1" longer than the size listed in the Bill of Materials. (We edge-joined narrower stock to form the wide panels.) Later, scrape off the excess glue and trim the four panels to finished size.

2 Cut the rabbets and dadoes in the cabinet sides (A) where shown and to the sizes shown on the Basic Cabinet Assembly drawing. Don't forget to machine a ¼" rabbet ½" deep along the back inside edge of the side panels.

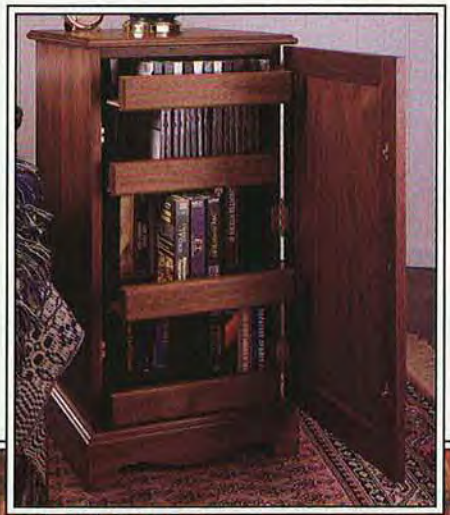
3 Cut the cabinet front stiles (C) to size plus 1" in length.

4 With the surfaces flush and an even overhang on both ends, glue and clamp a stile (C) to the front edge of each cabinet side (A). Trim the ends of the stiles flush with the ends of the side panels. Sand the side panels smooth.

5 Cut a ½" notch 1" deep in the front corners of each top and bottom panel (B).

6 Glue and clamp the top and bottom (B) between the side panels. Check for square and that the front edges are flush. The back edges of the top and bottom pan-

Continued



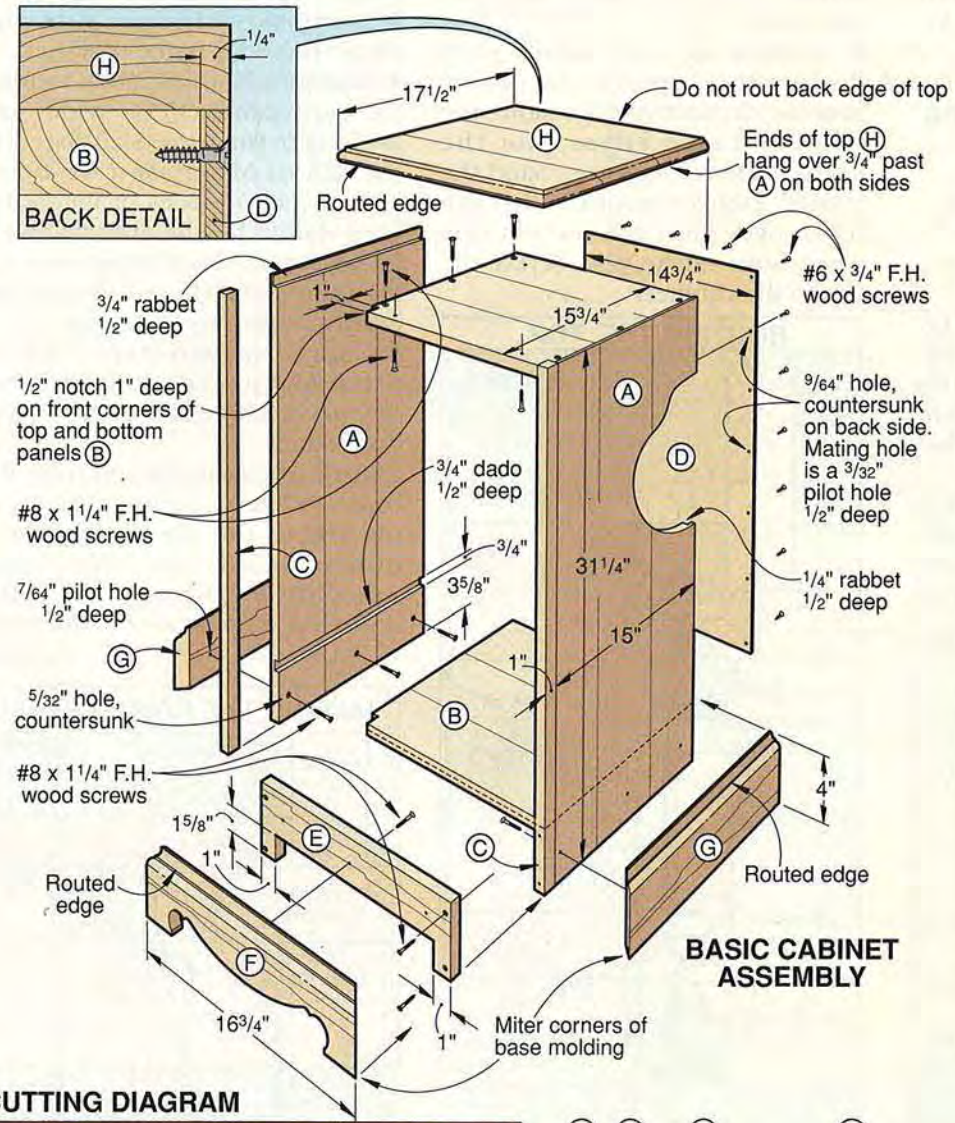
A hardwood hideaway for your CDs, videotapes, and cassettes

Bill of Materials					
Part	Finished Size			Matl.	Qty.
	T	W	L		
BASIC CABINET					
A* sides	¾"	15"	31¼"	EW	2
B* top & bottom	¾"	15¾"	14¾"	EW	2
C* front stiles	¾"	1"	31¼"	W	2
D back	¼"	14¾"	27⅝"	TH	1
E support	¾"	4"	15¼"	W	1
F* front base molding	¾"	4"	16¾"	W	1
G* side base molding	¾"	4"	17½"	W	2
H* top	¾"	17½"	16¾"	EW	1
DOOR					
I stiles	¾"	1¾"	27"	W	2
J lower rail	¾"	2¼"	11¾"	W	1
K upper rail	¾"	1¾"	11¾"	W	1
L* panel	½"	11 11/16"	22 15/16"	EW	1
M* stops	¼"	½"	23"	W	2
N* stops	¼"	½"	11¾"	W	2
O* stops	¼"	¼"	23"	W	2
P* stops	¼"	¼"	11¾"	W	2
SHELVES					
Q guides	½"	1⅛"	14½"	W	8
R fronts	¾"	2⅜"	13½"	W	4
S bottoms	¼"	13⅛"	14¾"	TH	4

*Initially cut parts marked with an * oversized. Then, trim each to finished size according to the how-to instructions.

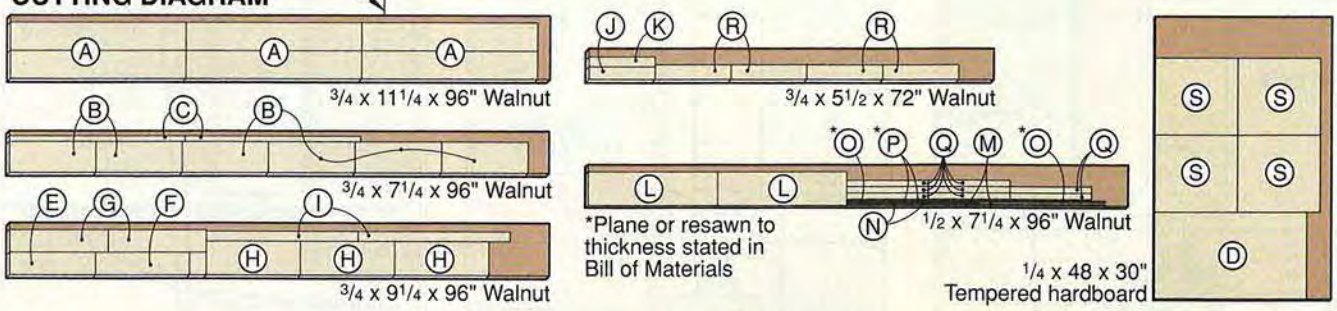
Materials Key: EW–edge-joined walnut, W–walnut, TH–tempered hardboard

Supplies: #6×½" flathead brass wood screws, #6×¾" flathead wood screws, #8×1" flathead wood screws, #8×1¼" flathead wood screws, ⅜×1½" dowel pins (those with glue grooves), double-faced tape, #8×½" flathead brass wood screws, #17×¾" brads, clear finish.



BASIC CABINET ASSEMBLY

CUTTING DIAGRAM


A A A
3/4 x 11 1/4 x 96" Walnut
B C B
3/4 x 7 1/4 x 96" Walnut
E G F I
H H H
3/4 x 9 1/4 x 96" Walnut
J K R R
3/4 x 5 1/2 x 72" Walnut
*O *P Q M *O Q
L L
N
1/2 x 7 1/4 x 96" Walnut
S S
S S
D
1/4 x 48 x 30" Tempered hardboard

*Plane or resawn to thickness stated in Bill of Materials

els should sit in ¼", leaving room for the back (D) where shown on the Back detail accompanying the Basic Cabinet Assembly drawing.

7 Measure the opening, and cut the back (D) to size from ¼" tempered hardboard. Fit the back in place, and drill mounting holes to the sizes listed on the Basic Cabinet Assembly drawing. Do not attach the back yet.

Now, add the base molding and cabinet top

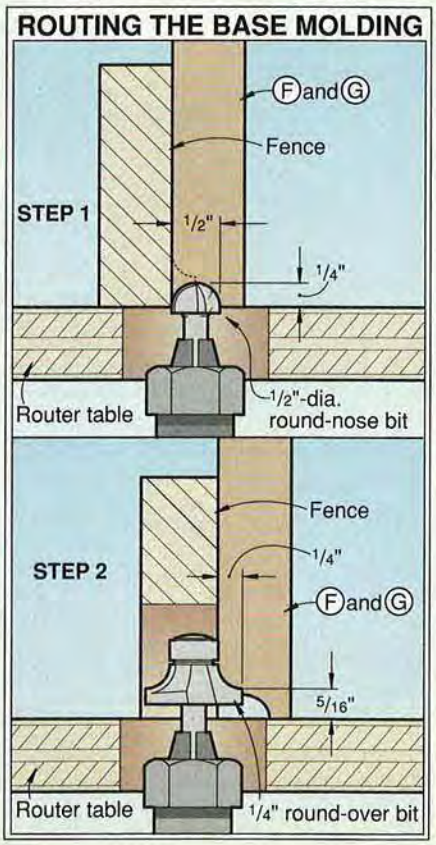
1 Using the dimensions on the Basic Cabinet Assembly drawing, cut the front base-molding support (E) to shape. Drill the holes and screw it to the cabinet.

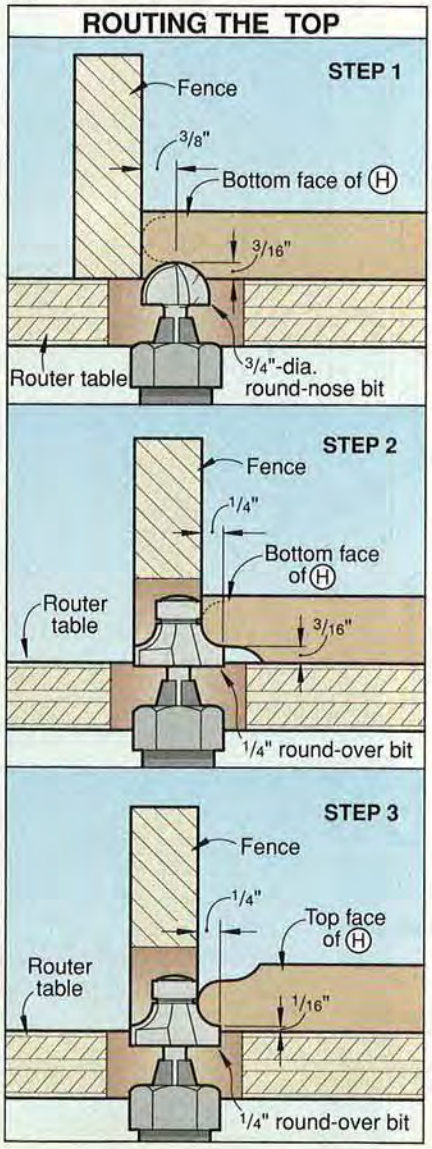
2 For base molding parts (F, G), cut a piece of ¾" walnut to 4×54". Following the two-step Routing the Base Molding drawing *below*, rout along one edge of the 54"-long piece.

3 Miter-cut the front (F) and then the sides (G) to length. Transfer the full-sized half-pattern to the front (F) twice to mark the curves along the bottom edge. Bandsaw the curved section to shape, and drum-sand smooth. Drill countersunk holes through the inside surface of A and E and into the inside face of F and G. Screw the pieces to the cabinet.

4 Edge-join enough stock for the cabinet top (H). Later, trim the top to size.

5 Following the three-step Routing the Top drawing *below*, rout the decorative edge along the front and side edges (not the back) of the cabinet top. Sand the routed edges smooth. With the back edges flush and the top centered from side-to-side, screw the top to the cabinet.





The raised-panel door comes next

1 Cut the two door stiles (I) and rails (J, K) to size.

2 Using the dimensions on the Door drawing and accompanying Section View detail, mark the dowel-hole locations and drill the holes. (We used a doweling jig.)

3 Using dowel pins, glue and dowel the door frame together.

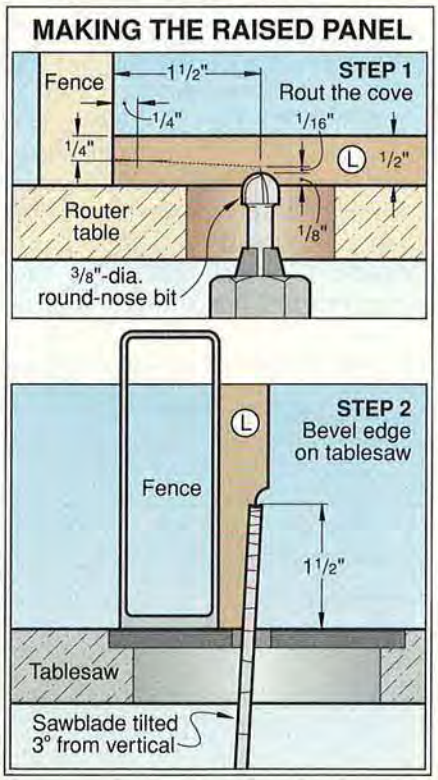
4 Edge-join ½"-thick stock to form the door panel (L) ¼" wider and ½" longer than the size listed in the Bill of Materials. (We book-matched two pieces of highly figured walnut for the door panel.)

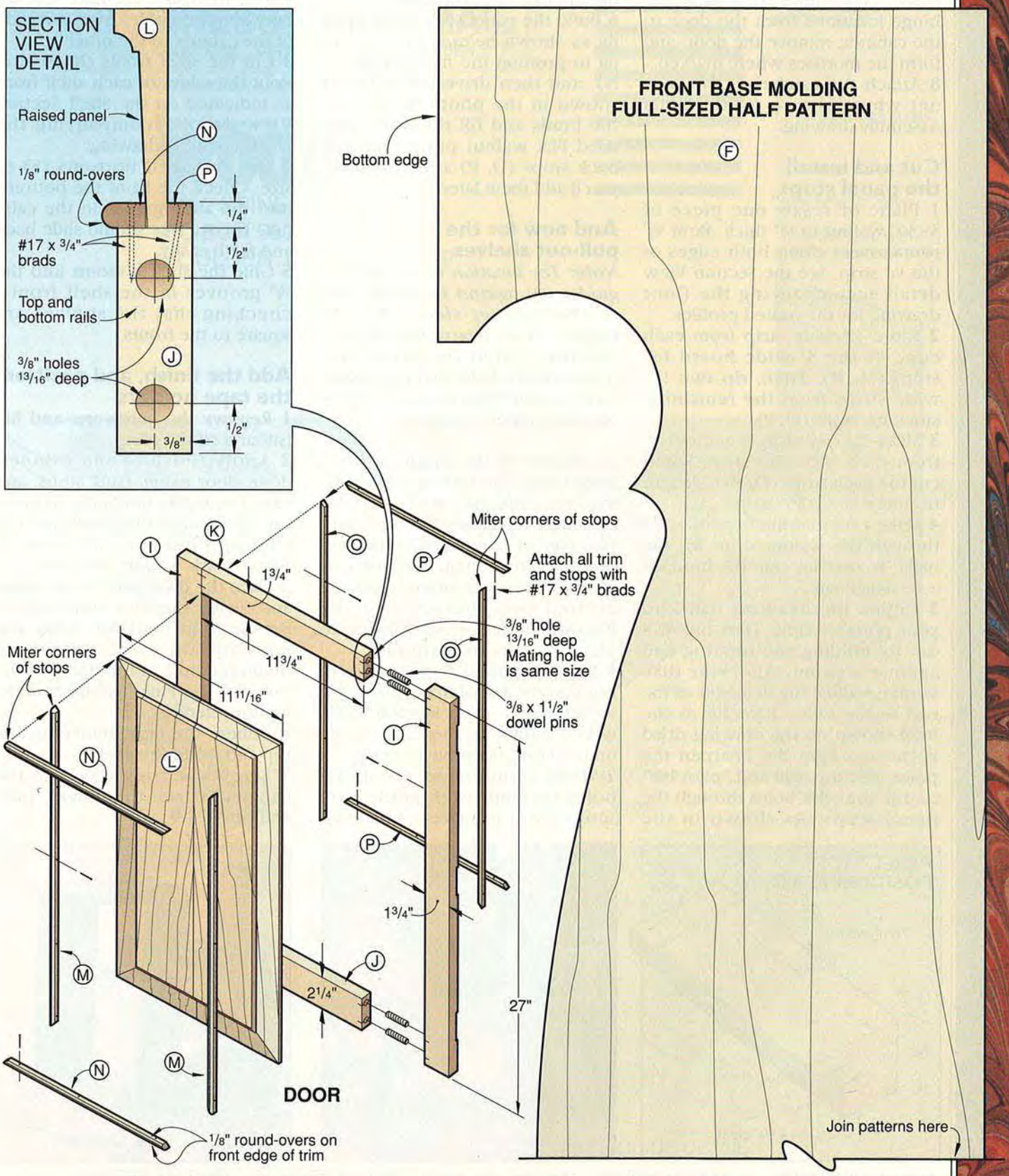
5 Measure the opening and cut the door panel (L) 1/16" shorter and narrower than the opening.

6 Using the two-step drawing titled Making the Raised Panel *below*, machine the edges of the door panel.

7 Mark the locations and form the three 1/16"-deep hinge mortises in the right-hand door stile where dimensioned on the Final Assembly drawing. Center the door top to bottom on the front

Continued




SECTION VIEW DETAIL
L
Raised panel
N
P
1/8" round-overs
1/4"
1/2"
#17 x 3/4" brads
Top and bottom rails
J
3/8" holes 13/16" deep
1/2"
3/8"
FRONT BASE MOLDING FULL-SIZED HALF PATTERN
Bottom edge
F
Miter corners of stops
Attach all trim and stops with #17 x 3/4" brads
I
K
O
P
1 3/4"
3/8" hole 13/16" deep Mating hole is same size
Miter corners of stops
11 3/4"
11 11/16"
3/8 x 1 1/2" dowel pins
N
L
I
P
1 3/4"
J
2 1/4"
27"
M
N
M
DOOR
1/8" round-overs on front edge of trim
Join patterns here

of the cabinet and clamp it in place. Mark lines to transfer the hinge locations from the door to the cabinet, remove the door, and form the mortises where marked.
8 Attach the catches to the cabinet where shown on the Final Assembly drawing.

Cut and install the panel stops

1 Plane or resaw one piece of 3×36" walnut to ¼" thick. Rout ⅛" round-overs along both edges of the ¼" strip. See the Section View detail accompanying the Door drawing for the routed profiles.
2 Rip a ½"-wide strip from each edge of the 3"-wide board for stops (M, N). Then, rip two ¼"-wide strips from the remaining stock for stops (O, P).
3 Miter-cut one stop M and one N from each ¼×½×36" strip. Miter-cut the back stops (O, P) to length from the ¼×¼×36" strips.
4 Make a bit to drill the pilot holes through the walnut stops for the nails. To do this, snip the head off a 4d finish nail.
5 Chuck the headless nail into your portable drill. Turn the drill on. By holding the rotating nail against a drum sander or disc sander, reduce the diameter of the nail to the same diameter as the brad shown on the drawing titled Forming a Pilot Bit. Sharpen the point. Use the drill and "pilot bit" to drill the pilot holes through the panel stops. As shown in the Section View detail, we angled the pilot holes in the stops.
6 Build the panel stop positioning jig as shown *below left*. Use the jig to position the front stops (M, N), and then drive the brads as shown in the photo *below*. Set the brads and fill the holes (we used FIX walnut putty). Set the back stops (O, P) aside for now; you'll add them later.

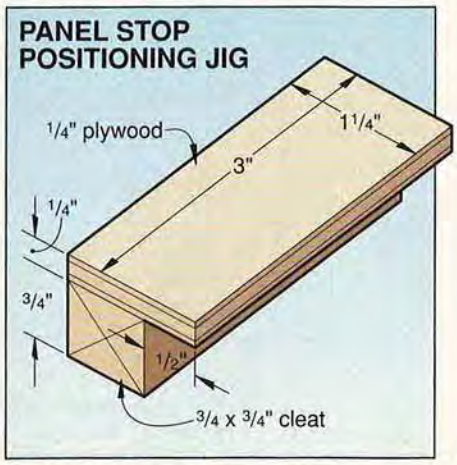
And now for the pull-out shelves

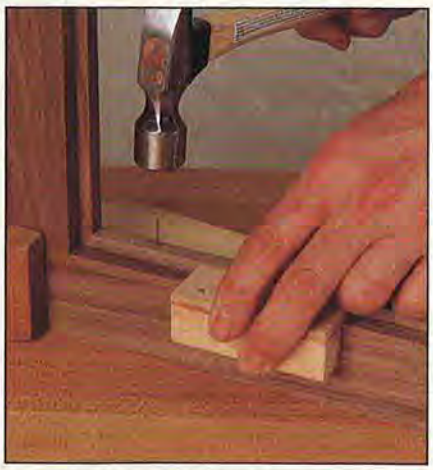
Note: *The location of the drawer guides (Q) against the inside face of the cabinet sides (A) will depend on the type of tape holders you use. Test-fit the guides (we temporarily held them in place with double-faced tape) before screwing them in position.*

As shown in the opening inset photo and Final Assembly drawing, we used two pair of audio cassette holders on the top shelf, two pair of compact disc holders on the second shelf, and one pair of video cassette holders on the bottom two shelves. See the Buying Guide for our source of plastic holders and hardware.
1 Cut the guides (Q) to the size listed in the Bill of Materials. Cut a ¼" groove ¼" deep in each guide where shown on the Guide detail on the Final Assembly drawing.
2 Drill countersunk mounting holes through each guide, and screw them in place. (As shown in the photo *below*, we used a spacer to ensure accurate spacing between the guides from one side of the cabinet to the other.)
3 Cut the shelf fronts (R) to size. Rout the edges of each shelf front as indicated on the Shelf Section View detail accompanying the Final Assembly drawing.
4 Cut the shelf bottoms (S) to size. Check the fit of the bottoms into the shelf guides in the cabinet. The shelves should slide back and forth easily.
5 Glue the shelf bottoms into the ¼" grooves in the shelf fronts, checking that the shelves are square to the fronts.

Add the finish, and position the tape holders

1 Remove the hardware, and finish-sand all the parts.
2 Apply finish to the cabinet, door, door panel, back stops, and shelf fronts. Do not apply finish to the hardboard shelf bottoms (S). (We applied several coats of Watco Dark Walnut Oil Finish.)
3 Place the door panel in the door and secure the back stops (O, P). Set the nails, putty the holes, and wipe off any excess. Drill the mounting hole in the door for the pull. See the Final Assembly drawing for reference.
4 Adhere the tape holders to the top surface of the shelves.
5 Screw the back (D) onto the cabinet. Attach the hinges, pull, and catches.

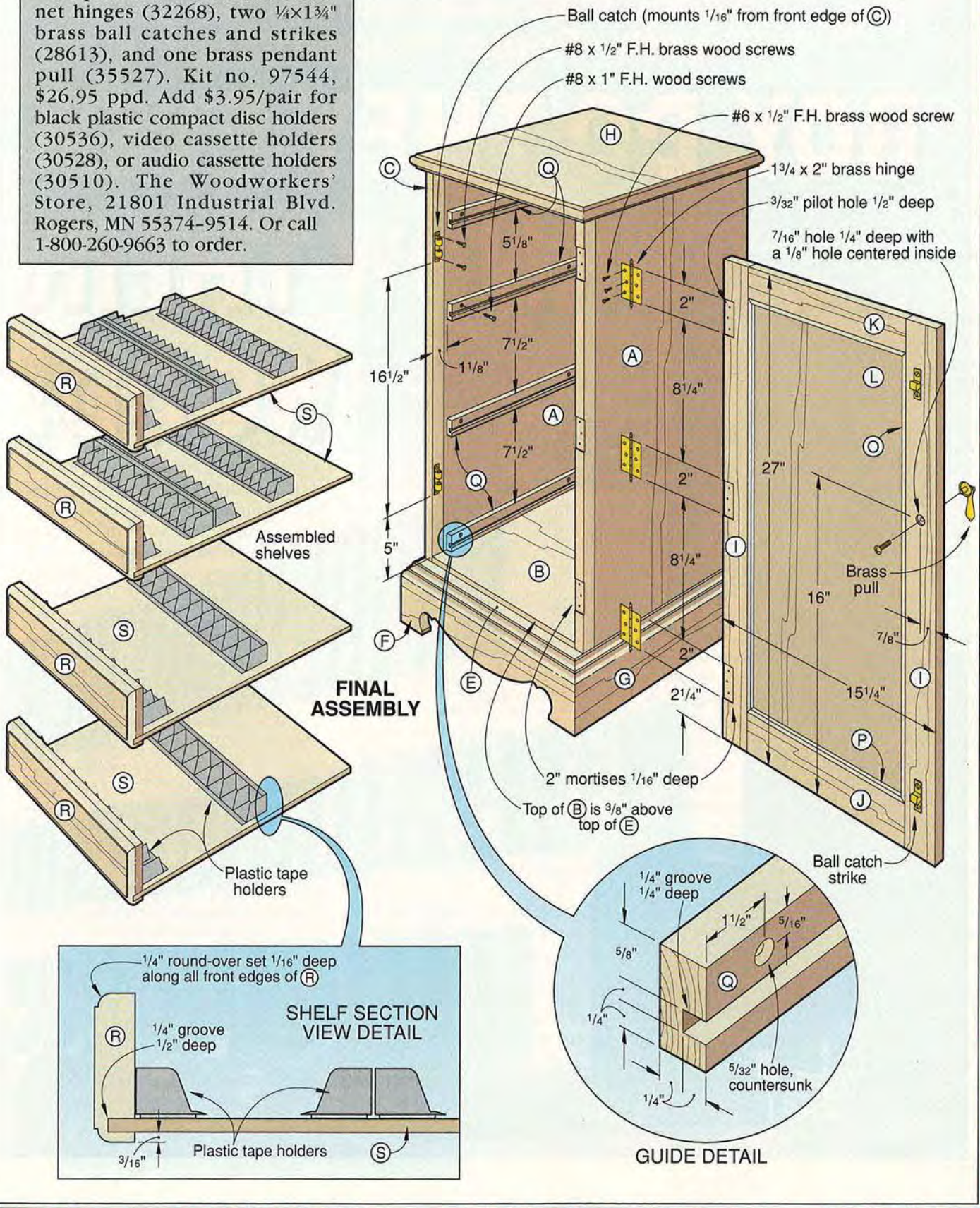




Produced by Marlen Kemmet Project Design: Jim Boelling Photographs: Wm. Hopkins Illustrations: Kim Downing Photo Stylist: Nancy Briggs

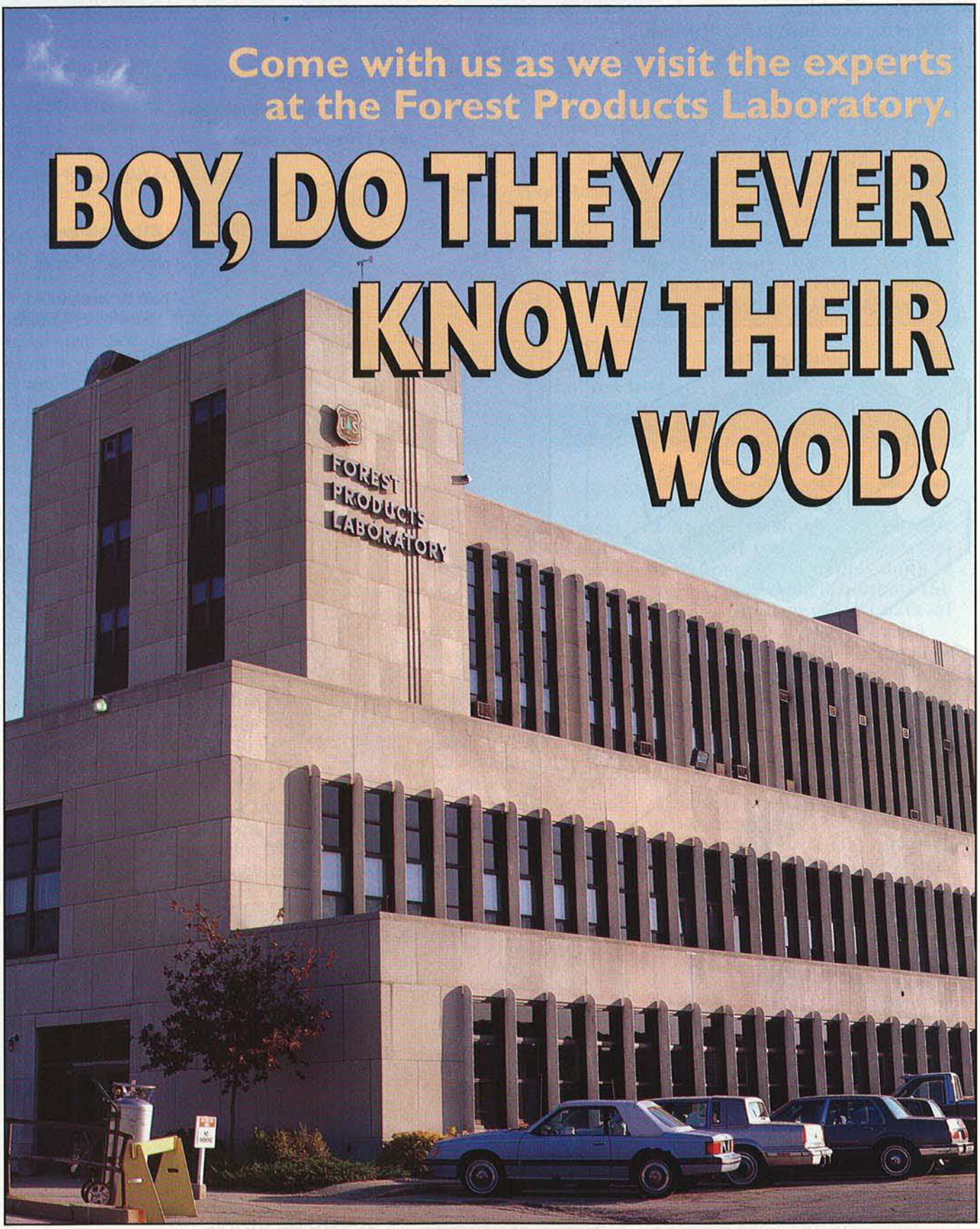
Buying Guide

•Hardware and tape holders. Two pair 1¾×2" solid-brass cabinet hinges (32268), two ¼×1¾" brass ball catches and strikes (28613), and one brass pendant pull (35527). Kit no. 97544, $26.95 ppd. Add $3.95/pair for black plastic compact disc holders (30536), video cassette holders (30528), or audio cassette holders (30510). The Woodworkers' Store, 21801 Industrial Blvd. Rogers, MN 55374-9514. Or call 1-800-260-9663 to order.


Ball catch (mounts 1/16" from front edge of Ⓒ)
#8 x 1/2" F.H. brass wood screws
#8 x 1" F.H. wood screws
#6 x 1/2" F.H. brass wood screw
1 3/4 x 2" brass hinge
3/32" pilot hole 1/2" deep
7/16" hole 1/4" deep with a 1/8" hole centered inside
Assembled shelves
FINAL ASSEMBLY
Brass pull
Plastic tape holders
2" mortises 1/16" deep
Top of Ⓑ is 3/8" above top of Ⓔ
Ball catch strike
1/4" round-over set 1/16" deep along all front edges of Ⓡ
SHELF SECTION VIEW DETAIL
1/4" groove 1/2" deep
3/16"
Plastic tape holders
1/4" groove 1/4" deep
5/32" hole, countersunk
GUIDE DETAIL

Come with us as we visit the experts at the Forest Products Laboratory.

BOY, DO THEY EVER KNOW THEIR WOOD!



I'd been past the impressive building often on trips to Madison, Wisconsin. Traveling down University Avenue, you can't miss seeing it in the skyline. 'What goes on in there?' I'd often thought. Finally, last summer, I made it a point to spend a day at the facility. The visit could have been days longer. What the Forest Service researchers have found out about wood and wood products is mind-boggling, not to mention what they've got going for the future! I'm reporting on just a few things I found of interest.

Peter J. Stephano
Senior Editor

Way back in 1910, forestry as we know it today was a little-understood science. Of course, everyone knew the role of wood. It became homes and business buildings, fences, ships, and railroad ties. And all across the northern lake states, lumber companies and their crews were harvesting vast stands of virgin white pine and hemlock to meet the demand.

But Gifford Pinchot (1865-1946), founder of the U. S. Department of Agriculture's Forest Service, saw a need to conserve this magnificent natural resource. He recognized the importance of forest management, and developed guidelines. Yet, Pinchot felt that that wasn't enough. Research, too, was needed to develop new forest products, thereby contributing to conservation by making the fullest use of our wood resource. Chipboard, for example, makes use of wood material that would otherwise be wasted.

So, in cooperation with the University of Wisconsin, the U.S. Forest Service's Forest Products Laboratory (FPL) was founded in Madison. At first, a few chemists and other scientists, along with a small support staff, took up quarters in the university. Then, in 1935, the present facility at One Gifford Pinchot Drive was built. Naturally, buildings as well as staff have been added so that now FPL occupies a 20-acre site and employs about 350 people, including about 120 scientists—botanists, chemists, plant pathologists, engineers, biologists, physicists, dendrologists, and other disciplines. There are also eight Forest Service research stations around the nation, strategically located in timber-producing areas.

Harry Alden relies on a hand lens to examine a wood sample sent in for species identification.

Getting to know wood from the outside in

John Zerbe, acting manager of FPL's important forest products Conservation and Recycling Technology Marketing Program, deals with basics: how to get the most wood from a tree. "We've been working with a mill that primarily saws small stuff—six- to eight-inch-diameter logs," he says in for instance. "Their [lumber] recovery had been averaging about 40 percent. Now, it's around 70 percent."

There's more to John's program, though, lots more. "Over the years, the Forest Products Lab has introduced computerized sawing which takes all the guesswork out of sawing for grade," he continues. "We've even seen research on sawing with high-pressure water jets—that's like using a laser. At present, we're doing lots of work in recycling, from the use of recycled paper in sheet goods to chipping down old pallets into wood fiber."

Across FPL's "campus," behind the sliding doors of the fiber and particle products area, some results of the recycling research program become evident. Here, chemists mix varying ingredients for fiber- and particleboard, then test the products for durability, strength, paint adhesion, and other characteristics.

And many of their raw materials are unconventional. Take *lignocellulosics*, for example. That's a word FPL uses to describe materials that contain both cellulose and lignin, two plant substances that normally combine to form wood cells. Included in the category are grasses like flax and a bamboolike plant called kenaf. Mixed with recycled polyesters, phenolic resins, polypropylenes, and even cattle hair, they become a new generation of sheet goods.

Eventually, every new forest product or construction technique developed at FPL must undergo tough laboratory tests. Imagine a huge hydraulic press menacingly poised above a stage large enough to accommodate a modest tract home. At the flip of a switch, it lowers, slowly exerting a force that represents tons of snow on roof trusses, sheathing, shingles, and load-bearing walls. This stress test which takes place in the three-dimensional structural frame, benefits architects, builders, and do-it-yourselfers.

Continued

In the papermaking section of the plant, a small press toys with slurry made from some of San Diego's curbside waste and wood fibers. Only instead of paper, the machine produces a space-age building material called—accurately enough—FPL Space board. This thin, light substance, with one smooth side and another that looks like a complex of tiny egg-carton depressions, can become wall sheathing, underlayment, and when covered with plastic laminate, even office furniture.

A full block away from the Spaceboard activity, you encounter the smell of burning wood. That's not unusual, though, in the fire-safety experiment area. Here, in a carefully controlled environment, researchers test fire-retardant treatments' effectiveness, the contribution of wall linings to fire growth, and the durability of fasteners in fire.

Of course, volumes could be written about the research and testing that continually occurs at this facility in the heart of Madison. (In fact, they're written and published almost daily by the staff. See the box on *page 57* for FPL's address and what's available from them.)

Outdoor finishes that can stand the test of time

As a research chemist conducting experiments with exterior finishes, Bill Feist has had his share of special challenges. "One year I had just a rash of calls from homeowners on the East Coast about solid-color oil stain peeling off their red cedar siding," says Bill. "It turns out that all the siding had come from British Columbia mills, and the phenomenon was caused by what we call 'mill glaze.'

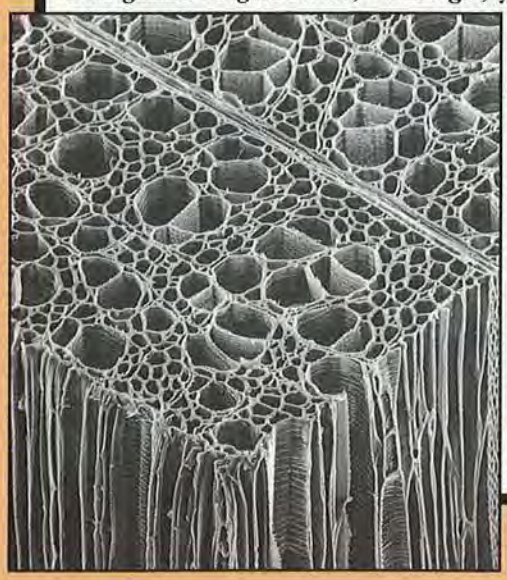
"Although we don't know yet exactly what causes it—the accumulation of extractives on the surface, the planing, or the drying process—mill glaze describes a condition in which the surface of the wood has hardened to the point where it can't be penetrated by a finish, or a finish can't adhere to it," Bill explains. "The surface has to be roughed up for an exterior finish to last."

At an open-air test site called Valley View, about 10 miles from the main FPL facility, Bill runs several experiments designed to test exterior finishes. And many of them back up his statement about roughing up wood for maximum finish protection. "On our siding samples here, we've found that a solid color oil stain on smooth, vertical-grain western red cedar can fail in six months," he says. "But if it were abrasive-planed, then given two coats of paint, it lasts the longest of all our samples. That first coat takes a lot of paint, but it will more than double the life of the coating."

At the Valley View exterior finish testing facility, Bill Feist inspects the wood on a test deck for finish durability.

Because FPL wanted to test the protection of different types of finishes on decking of various species and grades, they had an extensive deck built at Valley View. All the results aren't in yet, but FPL has so far discovered that CCA-treated wood holds a finish better than redwood or cedar, and

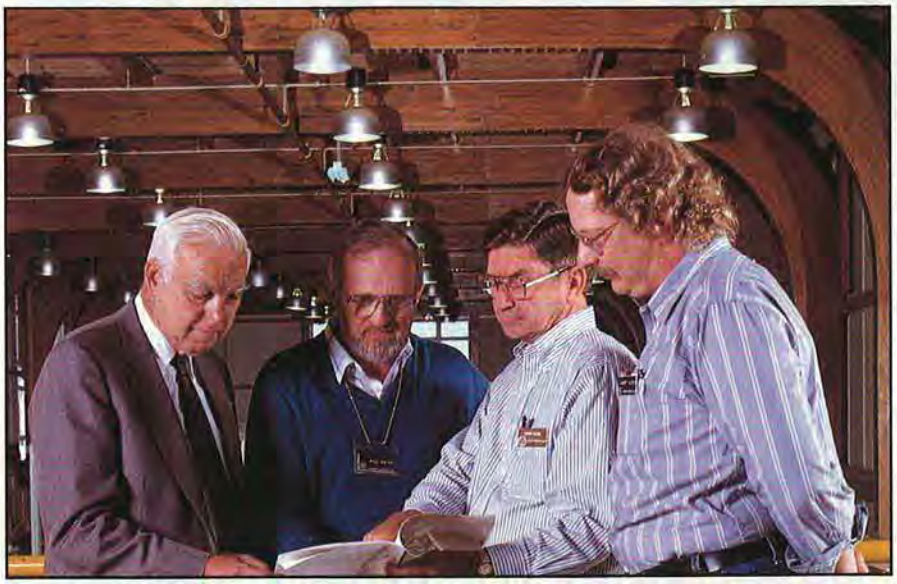
With electron micrographs, FPL researchers study the elements of wood structure. The vessels *below left* are a characteristic feature of broad-leaved hardwoods. At even greater magnification, *below right,* you view a hardwood's earlywood pores.



Surprising facts about outdoor finishes

Here are some more—often surprising—lessons Bill has learned in the outdoors:

- Western red cedar wears away from the weather 20 percent faster than either redwood or fir and therefore requires the most protection.
- Clear finishes on all surfaces fail faster than toned ones.
- Woods with high-tannin content, such as redwood or red cedar, react with steel or electroplated fasteners. Even particles from steel wool or a wire brush on these woods can trigger a reaction under a finish.
- To renew weathered redwood and cedar, wash them with a mixture of household bleach and water.
- Never let any wood weather prior to finishing.
- To repaint a weathered finish, first sand and wash, then treat with a water repellent. But never paint over decay.



From a balcony in FPL's huge pilot plant which features massive glulam beams (seen in background), researchers (from left) John Zerbe, Bill Feist, Sid Boone, and Harry Alden, do some impromtu planning.

that it really doesn't matter how the deck boards are laid. "When the bark side is up, checking and cracking results. Pith side up, you get delamination or grain-raising," Bill comments. "A deck manufacturer who installs 10,000 decks a year told me that the best policy is to install the most attractive side up and don't worry about whether it's the bark side or pith side. And that seems to be the case here."

How dry is dry?

From his office in FPL's main building adjoining the University of Wisconsin campus, Sid Boone fields lots of telephone calls. As part of the Wood Processing and Drying Systems program staff, he fields questions on everything from how to successfully air-dry red oak to advice on how to build and operate a solar drying kiln. And he responds to all in direct, easy-to-understand terms.

"In fact," Sid explains, "we mail out a reply to the most commonly asked questions, just so they'll have hard copy to refer to. And our fact sheets are written with the minimum technical jargon and maximum common sense."

Most of the questions that reach Sid have to do with how dry the wood has to be for furnituremaking or other projects, and how to keep it that way. He has a standard answer.

"Wood is commercially kiln-dried to six- to eight-percent moisture content because that's what homes with central heating and air conditioning will be at most of the time. So, to avoid wood movement, it has to be that low for indoor use," he comments. "Outdoors, though, such as for porch furniture, you can use air-dried wood of higher moisture content—let's say air-dried wood of 11 to 12 percent moisture."

And when it comes to kiln-dried wood, Sid ends every conversation with one emphasis. "Because kiln-dried wood will pick up moisture, buy or dry only what you can use in a moderate amount of time, such as a year. And store it where the humidity approximates that of the place where it will be used after it's made into a project." End of lesson.

What wood is that?

Still another guru at FPL, Regis Miller directs the Center for Wood Anatomy Research. Amid a host of other duties, this accomplished expert in rain-forest woods (and most of the world's commercial wood as well) curates the world's largest research wood collection. It includes over 100,000 samples. With a resource like that, it's no wonder that Regis' department identifies wood samples for diverse organizations.

"I've worked with archaeologists and paleontologists to identify wood found in boats that they have unearthed that were thousands of years old," says Regis. "We also identify wood for the National Park Service so their building restorations can be accurate. I have also worked as an expert witness to identify wood associated with crime cases. Of course, we do identifications for industry and woodworkers, too."

But, according to the director, because FPL's wood identification service is the only one of its kind in government, there's a great demand on their small staff. So, an individual is therefore limited to the identification of five wood samples per year.

FPL knows, and they share

For details on their wood identification service, as well as a general listing of subject areas in which FPL has published research findings, write to: *Information Services, U.S. Dept. of Agriculture Forest Service, Forest Products Library, One Gifford Pinchot Dr., Madison, WI 53705-2398.* Specifiy the information that you want.

Many of FPL's bulletins and publications are free. Those that have been printed by the U.S. Government Printing Office are availalble for a fee. Personal response regarding wood and wood products often can be obtained directly from the pertinent department by calling 608/231-9200. Free public tours of FPL are also available Mon.-Thur. at 2 p.m. from the main lobby.

Written by Peter J. Stephano Photographs: Jim Fietz

BRING IN THE SHOP COMPRESSORS

If you feel blown away by all the choices available in today's air-compressor market, you're not alone. We felt the same way before producing this article. To get a handle on this tool group, we narrowed our choice to nine models with the features that woodworkers demand, in an affordable price range. Then, we put these units through their paces to see which ones came out on top.

QUINCY
131A20PN3

A mighty-handy machine to have around

As we reported in the December 1993 issue of *WOOD®* magazine, air-powered brad nailers and staplers have found widespread popularity among woodworkers. And for many of us, the advantages of a pneumatic nailer alone would be reason enough to own a compressor. But, the uses for these incredible air-producing machines go well beyond fastening applications.

Today, you can purchase a truly amazing array of air-powered tools for woodworking, automotive, and other applications throughout your shop and home. Some of the more commonly found air-powered tools include drills, sanders (narrow-belt, random-orbit, straightline, and palm-grip orbitals to name a few), spray guns, air brushes, impact wrenches, ratchets, grinders, tire inflators, and sandblasters. You even can buy air-powered circular saws, jigsaws, routers, drywall-texture pistols, grease and caulk guns, hacksaws, and screwdrivers.

Many of these tools cost less than their electric-powered counterparts, and they make considerably less noise. (Compressors produce quite a bit of noise, but you can often isolate this noise from your work environment by piping in the compressed air.) We also find air-powered tools easier to handle because they weigh less, and they don't require as much storage room. And because you can quickly connect any number of air tools to a single hose, you don't have to do battle with separate power cords.

Generally, air-powered tools operate more smoothly than electric versions, with equal or greater power. And, thanks to sturdy construction and few moving parts, you can't beat the reliability of a pneumatic tool.

Print this article

AIR FORCE

PRICED $300–$400

How compressors put the squeeze on air

All compressors work in basically the same way. They pump air into a tank where it remains under pressure until you need it to run a tool. However, among our tested models, we found two distinctly different types of pumps—*oil-lubricated* and *oil-less*. Here's a close look at each:

Like the model depicted *below*, oil-lubricated compressors have a *flywheel* driven by a *motor* via a *belt*. These components turn a *crankshaft* that pumps the *pistons* up and down. On the downstroke, these pistons draw air through the *air-intake valve*. On the upstroke, the air pushes through an *air tube* and into the *air tank*.

As more and more air builds up in the tank, it becomes compressed to the point where the motor "kicks out"—usually 110 or 120 pounds per square inch (psi). As you use the air, the pressure drops to about 80–90 psi, then the motor "kicks in" again.

Like a car engine, oil-lubricated compressors have an oil-filled crankcase. The oil reduces the friction between the moving parts within the crankcase and cylinder block. This helps the components wear less and run cooler and quieter.

By comparison, oil-less air compressors require no lubrication because they have Teflon-coated components at the wear points between the piston and cylinder. To cool these parts, oil-less compressors have a fan-cooled open crankcase as shown *right*. There's no belt, flywheel or crankshaft

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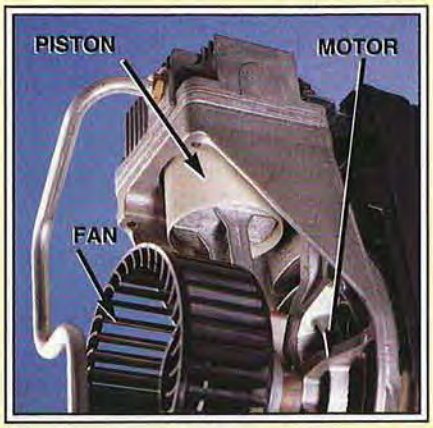
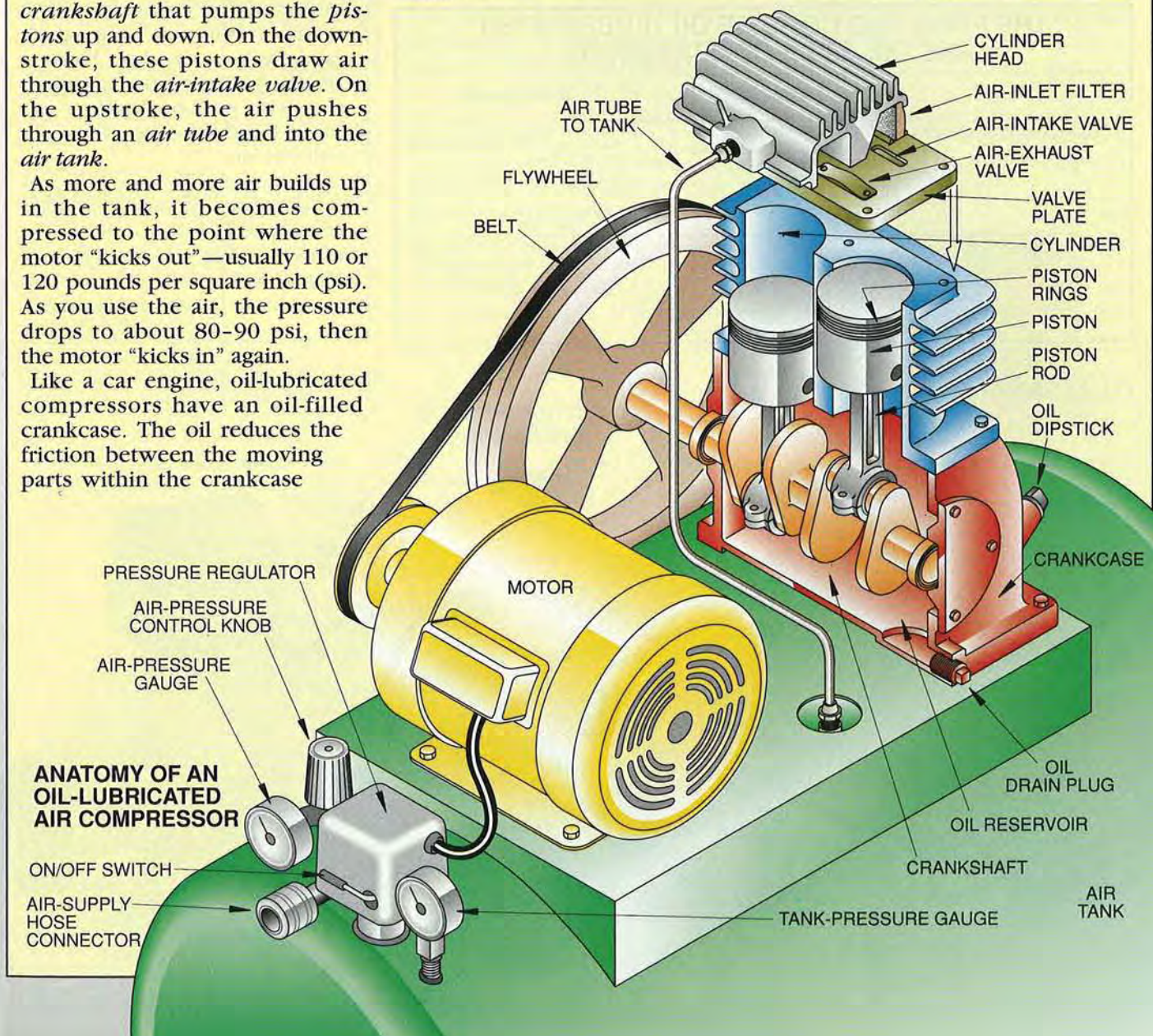




AIR FORCE

because the motor connects directly to the piston rod via an eccentric-bearing assembly.

Our tests revealed important performance differences between the oil-lubricated and oil-less compressors. The chart *below* summarizes the advantages and disadvantages of each system.

As you might suspect from reading the chart, oil-lubricated units appeal more to the serious air-power user. Oil-less units have advantages geared to sporadic users who don't want to be concerned with routinely maintaining a compressor.

If you decide that an oil-lubricated compressor suits your needs, then you will need to choose between versions with a separate cast-iron crankcase and cylinder block, and models with a one-piece aluminum crankcase/cylinder block assembly.

Our tests showed that the cast-iron units were about two decibels quieter than the aluminum models (easily noticeable to the ear). Also, manufacturers and service personnel told us that cast-iron units hold up a little better (about 500 additional hours between pump rebuildings). On the other hand, aluminum construction helps hold down the manufacturing costs of the unit, and makes the tool a little lighter.

THE PROS AND CONS OF OIL-LUBRICATED AND OIL-LESS COMPRESSORS

	ADVANTAGES	DISADVANTAGES
OIL-LUBRICATED COMPRESSORS	• Much quieter operation • At least twice as much life between pump rebuildings. (Properly maintained machines may last a lifetime.)	• You need to regularly check oil level and change oil every 6-12 months depending on usage. • Rebuildings require advanced mechanical skill. • Can pass oil into tank and air hose when piston rings become worn.
OIL-LESS COMPRESSORS	• Little regular maintenance required. • Most people can do pump rebuilding themselves. • Very safe because of lack of moving parts and nearly total enclosure of hot components. • No chance of oil contamination in air hose.	• Produce louder and more irritating noise. • Open crankcase makes piston-assembly susceptible to dust-related problems in woodworking environment.

Shop for air delivery, not horsepower

Power-tool manufacturers tell us that most consumers place a great deal of importance on horsepower when buying power tools. Not surprisingly, most manufacturers of home-use compressors emphasize horsepower ratings. To "pump up" the horsepower ratings, all manufacturers of compressors in this market list the "peak" horsepower of the compressor motors rather than the more-realistic "continuous-duty" rating found on most stationary woodworking machines. (A motor with a continuous-duty rating of 2 hp may have a peak rating as high as 4 hp.) For this reason you can run compressors with peak-horsepower ratings as high as 4 hp on a 120-volt circuit.

But, no matter what type of horsepower rating a manufacturer uses, this specification doesn't give you an accurate idea as to how much air a compressor will deliver. Because

OIL-LESS MODELS

Sears 15292

Sanborn M07F350-20

Air America F3520

CFM REQUIREMENTS FOR PNEUMATIC TOOLS

TYPE OF TOOL	CFM REQUIREMENT (AT 90 PSI UNLESS NOTED OTHERWISE)
BRAD NAILERS	1
LIGHTWEIGHT STAPLER	1
FINISH NAILER	3
FRAMING NAILER	6
ROOFING NAILER	6
SHEATHING STAPLER	6
3/8" IMPACT WRENCH	3
1/2" IMPACT WRENCH	5
3/4" IMPACT WRENCH	7
1/4" AIR RATCHET	4
3/8" AIR RATCHET	5
1/2" AIR RATCHET	5
3/8" DRILL	9
RANDOM-ORBIT (DUAL-ACTION) SANDER	14
STRAIGHTLINE SANDER	7
JITTERBUG (PALM-GRIP) SANDER	14
MINI BELT SANDER	9
LIGHT-DUTY SPRAY GUN	3 @ 40 PSI
COMMERCIAL-DUTY SPRAY GUN	7 @ 40 PSI
TOUCH-UP SPRAY GUN	3 @ 40 PSI
HOME-DUTY SANDBLASTER	9
CAULK GUN	1
GREASE GUN	1

the design of a compressor's pump can dramatically affect its air delivery, regardless of the motor driving it, you need to compare air delivery rates when evaluating compressors. Manufacturers list air delivery in cubic feet per minute (cfm), and we've listed these specifications for the tested compressors in the chart at the end of this article.

To determine your cfm needs, check the chart *left*. It shows the cfm requirements for some commonly used pneumatic tools. Then, select a compressor that can deliver the amount of air required for the tools you'll use. If two or more tools will be powered simultaneously by your compressor, then add together the required cfm.

Remember that cfm ratings only give you a general idea of what a tool requires and what a compressor will deliver. So, it makes sense to buy a compressor that's a little more powerful than what you think you need. Also, try to anticipate future needs when buying a compressor. For example, if you don't use a pneumatic random-orbit sander now, but think you might, you may want to spring for a compressor capable of supplying its air requirement.

In the chart at the end of this article, we rate the compressors according to how well they keep up with two tools: a random-orbit (also called dual-action) sander, and a spray gun. Note that all of the machines did a good or excellent job with these two tools in intermittent usage under average home-workshop conditions. If you use the tools in a continuous, production-type setting, you may need a more-powerful compressor. In that case, discuss your needs with an air-compressor supplier or manufacturer.

Continued

OIL-LUBRICATED MODELS

Sanborn G500BPL44V

Charge Air Pro 5E30AD

Campbell Hausfeld VT6196

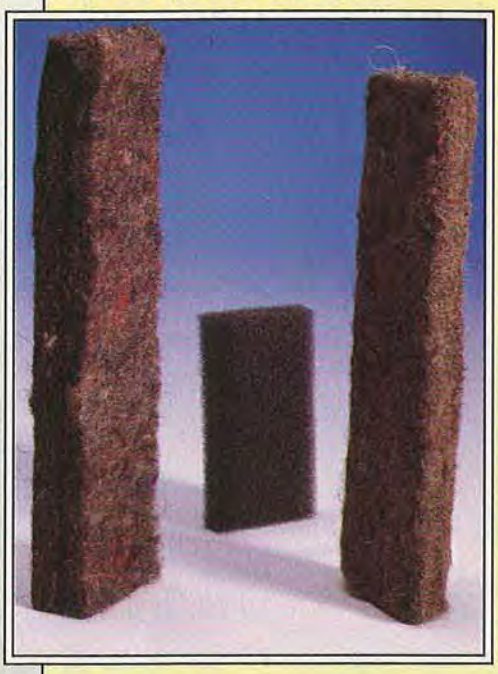
AIR FORCE

More points to consider

Air filters

We discovered big differences in the size and quality of the air filters on our tested compressors. These filters clean incoming air before it reaches the pistons. They also muffle noise somewhat. We consider this an important feature for typical dust-ridden woodworking shops.

As you can see *below*, we came across felt and foam filters in various sizes. The larger felt filters do the best job of filtering air.



Oil-lubricated compressors have felt air filters like those on the left and right from Quincy and Sanborn units. Oilless machines have small foam filters like the Air America version (middle).

Tanks

A large air tank has one advantage over a smaller air tank: it will delay the time before the pressure drops in the tank and the compressor kicks in. This may buy you some extra time when using air-gobbling tools such as random-orbit sanders. But, a large tank doesn't improve the performance of a compressor under continual-use circumstances.

Oil drains and plugs

Of all the tested units, only the Quincys provide dipsticks you can remove by hand for quickly and accurately checking the oil level. However, these were also the only oil-lubricated models that did not provide for convenient oil draining. As shown *bottom,* the oil drain on the Quincy does not extend past the crankcase, all but ensuring that you will spill drained oil on the machine. The other compressors have extended oil drains that you can place a basin under for catching waste oil as shown *below*. A Quincy representative said his company recognizes this shortcoming and plans to fix it by adding an extension to the oil drain.

Like the Charge Air Pro shown here, most oil-lubricated compressors have extended oil-drain plugs.

Because it doesn't extend from the crankcase, the Quincy oil-drain plug can lead to messy oil changes.

Balance

If you need to move a compressor from place to place on a regular basis, take note of how much effort it takes to lift the front end and roll the machine. The Sears 15293 was excellent in this regard. As shown *below*, we could lift this well-balanced unit with one finger. It also has a 1"-diameter handle that we could easily grasp (most of the other units had ½"-diameter handles.

Good balance and a stout handle make the Sears15293 a breeze to move from place to place.

Safety

If small children or inexperienced users frequent your shop, pay attention to the "guard" rating in the chart on the *following page*. Hot air tubes, spinning flywheels, and fast-traveling belts can do serious harm if not fully shielded.

SIDE-TO-SIDE COMPARISON OF NINE COMPRESSORS PRICED $300-$400

MANUFACTURER	MODEL	CONSTRUCTION (1)	NUMBER OF CYLINDERS	MOTOR: HORSEPOWER (2)	MOTOR: VOLTAGE	TANK CAPACITY (GALLONS)	CFM @ 40 PSI (3)	CFM @ 90 PSI (3)	FILTER TYPE	EVALUATION (4): NOISE LEVEL (5)	VIBRATION	GUARDS	PERFORMANCE WITH DUAL-ACTION SANDER	PERFORMANCE WITH PAINT-SPRAYING GUN	OVERALL RATINGS (6): PERFORMANCE	VALUE	APPROXIMATE HOURS BEFORE PUMP REBUILDING (7)	APPROXIMATE COST OF BASIC REBUILD (7)	RECOVERY TIME (SECONDS) (8)	COUNTRY OF ASSEMBLY	LIST PRICE (9)	SELLING PRICE (9)
AIR AMERICA	F3520	A	1	3.5	120/240	20	8.4	6.7	FOAM	F	G	G	G	E	6	7	750-1,000	$ 50	33	US	N/A	$300
CAMPBELL HAUSFELD	VT6196	C	2	4	120/240	20	8.1	6.4	FELT	E	F	E	E	E	8	8	2,000 PLUS	60	36	US	$545	370
CHARGE AIR PRO	5E30AD	B	2	5	240	30	11.3	9.3	FELT	G	G	E	E	E	9	8	1,500	45	31	US	N/A	399
QUINCY	121A20PN3	C	2	2	120/240	20	7.1	5.8	FELT	E	E	G	G	G	9	9	2,000 PLUS	50	30	US	771	365
	131A20PN3	C	2	3.5	120/240	20	8.1	6.7	FELT	E	E	G	E	E	10	10	2,000 PLUS	50	16	US	788	390
SANBORN	M07F350-20	A	1	3.5	120	20	8.6	6.7	FOAM	F	P	E	G	E	6	8	750-1,000	60	39	US	640	300
	G5008PL44V	B	2	5	240	44	12.7	10.6	FELT	G	E	E	E	E	9	9	1,500-2,000	75	30	US	870	400
SEARS	15292	A	1	4	120/240	25	9	7	FOAM	F	F	E	G	E	6	8	750-1,000	50	54	US	N/A	299
	15293	A	2	6	240	33	15	11.5	FELT	F	G	E	E	E	9	8	750-1,000	100	50	US	N/A	399

NOTES:

1. (A) Oil-less.
   (B) Oil-lubricated, one-piece aluminum crankcase and cylinder-block assembly with steel cylinder liner.
   (C) Oil-lubricated, cast-iron construction.
2. Maximum developed horsepower according to manufacturer.
3. Air delivery expressed in cubic feet per minute at a given pressure per square inch according to manufacturer.
4. E Excellent; G Good; F Fair; P Poor
5. E 72-73 decibels; G 74-75 decibels; F 76-77 decibels
6. Machines rated on 1-10 scale, with 10 being the highest possible score. Performance rating does not take price into account. Value rating takes price and performance into consideration.
7. Determined through interviews with manufacturers, distributors, and service-center personnel. Rebuilding costs are for parts only.
8. Average length of time that compressor runs in order to recharge air supply in tank. Except for the Quincy machines, all of the tested models kicked in when the tank pressure dropped to about 90 psi, and kicked out when the tank pressure reached 110 psi. The Quincys kicked in at 80 psi, and kicked out at 100 psi.
9. (N/A) Not available
   Selling prices based on catalogs and dealer inquiries at time of article's production.

MANUFACTURERS' LISTING:

Air America and Charge Air Pro, manufactured by DeVilbiss:
901/423-7000

Campbell Hausfeld:
513/367-4811

Quincy:
217/222-7700

Sanborn:
507/723-6211

Sears:
Call or visit your local Sears store.

Recovery time: the best machines recharge quickly

To judge for ourselves the air-pumping power of the test machines, we timed how long it took each of them to repressurize its tank. To do this, we discharged the air in the tanks until each compressor reached its kick-in pressure. With our stopwatch running, we timed how long it took each compressor to reach its kick-out pressure and turn off. We repeated this procedure five times and recorded the average recovery time in the chart at the end of this article. When looking at these figures, keep in mind that it takes equally powerful pumps more time to pressurize a larger tank (the test tanks ranged from 20 to 44 gallons).

At the conclusion of this test, we were especially impressed with the Quincy 131A20PN3. True to what Quincy representatives told us, this manufacturer appears to take a conservative approach to rating the power of its compressors. Here's why: Although its cfm and horsepower ratings would make this machine appear to be about equal to, or less powerful than, most of the machines in our test, its recovery time was 16 seconds—about half the time it took other compressors to recover.

Our recommendations

At the conclusion of our testing, the Quincy 131A20PN3 stood out as the machine we would most like to have in our own woodworking shops. In addition to its excellent air delivery and short recovery time, it had the highest-quality components of any machine in the test. The Campbell Hausfeld VT6196 came in a close second among the portable units.

For those of you who make frequent use of pneumatic tools with high-cfm requirements, we give our top rating to the Sanborn G500BPL44V. With its high-output air pump and 44-gallon tank, this machine delivers a lot of value. Sanborn also manufactures a similar compressor in this price range with a 60-gallon tank.

If the benefits of an oil-less compressor appeal to you, we urge you to turn one on before making a purchase. Some people find the noise generated by these machines intolerable. But, you may be able to put up with it for occasional use, or with ear protection.

Written by Bill Krier Technical consultant: Dave Henderson Illustration: Kim Downing Photographs: Hopkins Associates

What woodworkers need to know

THE NUTS AND BOLTS

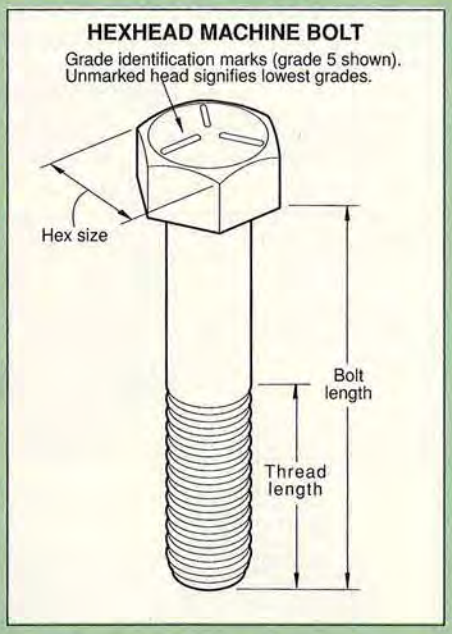
Answers to some wrenching

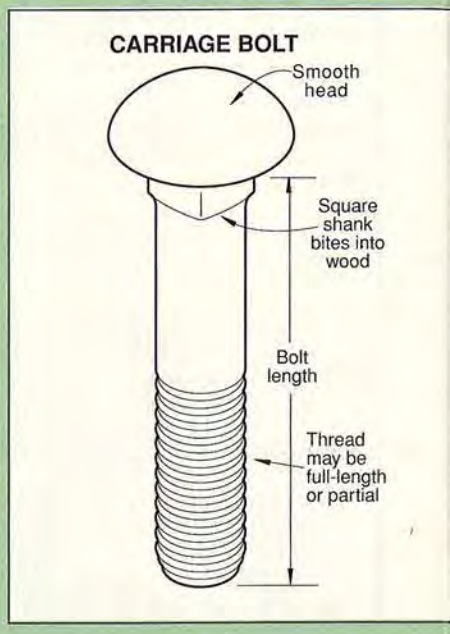
Woodworkers generally rely on fasteners that take their grip in the wood, such as nails or screws. But some cases call for a fastener that resists pulling out, something that acts like a clamp, something like a nut and bolt.

Nuts and bolts have a long history in woodworking. Wagons and carriages, for example, couldn't have held together more than a few miles if builders had used only nails or wood screws.

Today, nuts and bolts come in handy for outdoor furniture, play structures, and other projects that will see rough use. They're ideal for attaching hinges or other hardware. They allow easy disassembly and reassembly without the danger of stripping out screw holes. And, with nuts and bolts, you can make a pivoting joint that resists working itself loose.

Print this article


HEXHEAD MACHINE BOLT
Grade identification marks (grade 5 shown). Unmarked head signifies lowest grades.
Hex size
Bolt length
Thread length



The big three in bolts

Bolts come in startling variety. But for this survey, we'll skip the unusual types and specialty fasteners. Let's just look at three kinds you'll find most useful. You can buy these basic bolts at hardware stores or homecenters.

● **Hexhead bolt.** For many, the first stumbling block is determining a bolt's size. A string of numbers like ¼-20×5" or ⅜–16×4" isn't exactly self-explanatory, but it is easy to decode.

The first element in the string refers to the diameter of the bolt body, ¼" and ⅜" in our examples. The second number is the thread pitch—the number of threads per inch on the bolt. In our examples, the ¼"-diameter bolt has 20 threads per inch, the ⅜" one 16, both standard coarse threads (see the chart *right* for other common coarse and fine threads).

The last number shows the bolt's overall length, measured from the bottom of the head. Thread length varies with bolt diameter and length, generally falling within the range of twice to four times the bolt's diameter. Though standard machine bolts don't have full-length threads, you may find other types that do.

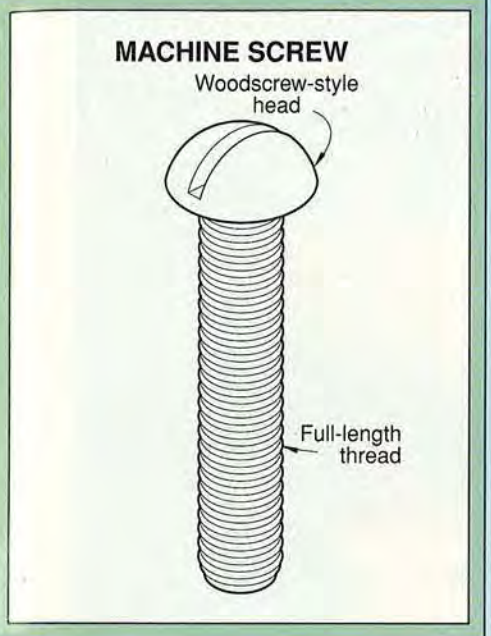
Many hardware stores carry bolts in different grades. For most woodworking applications, the lowest grade, usually 0, 1, or 2, will suffice. Higher grades, identified by radial markings on the head, offer greater strength.

● **Carriage bolt.** Well-suited to joining wood or attaching hardware to wooden parts, this bolt features a smooth, domed head with a square shank right underneath, shown in the illustration. Tightening the nut onto the bolt draws the shank into the hole drilled through the wood, keeping the bolt from turning.

Some hardware has square holes, allowing installation with a carriage bolt head on the front. Otherwise, to install hardware with carriage bolts, insert the bolt

Illustrations: Kim Downing

OF THREADED FASTENERS
questions



through the wood and tighten the nut against the hardware.

● **Machine screw.** A machine screw looks like a bolt with a woodscrew-type head on it. You may find machine screws in diameters up to ⅜"; ¼" and less are more commonly available. You'll often hear a ¼-20 machine screw refered to as a stove bolt.

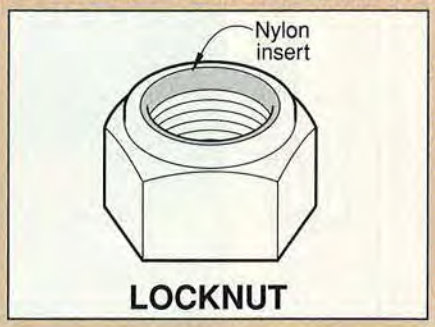
Below ¼", machine screw diameters except for ⅛" and 3⁄16" are customarily designated by gauge numbers. Thus, a 10-32×2" machine screw is a #10 diameter screw with 32 threads per inch, 2" long. (By the way, the first set of numbers isn't a fraction. So don't say, "ten thirty-seconds" when you refer to the screw in the example. Just say, "ten thirty-two.")

Machine screws are generally roundheads or flatheads with straight or Phillips slots. Some dealers stock machine screws and hex bolts in stainless steel or brass. Ordinarily, hexhead and carriage bolts are zinc plated.

Nuts and washers and such

Always place a washer between the hexhead and the wood to increase the bearing surface. You don't need a washer under a carriage-bolt head—in fact, you don't want one there at all.

Likewise, put a washer under a hex nut bearing directly on the wood. You can get by without one when the nut tightens against a piece of hardware.



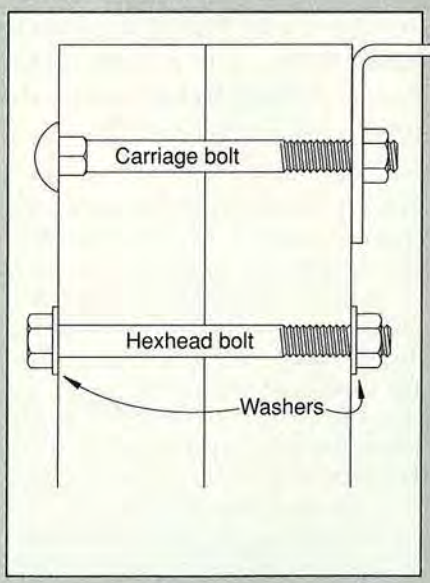
Lock washers can keep a nut from working loose, but there are other, neater choices. A nylon-insert locknut is a good option, one that's particularly useful for pivoting joints. Unlike a lock washer, the locknut doesn't need to be torqued down to be effective; it will stay put anywhere on the bolt threads.

Chemical thread lockers, such as Loctite (available from auto-supply stores) work great, too. They also can inhibit rust and thread seizure—a plus for outdoor projects that disassemble for storage.

Assembly couldn't be easier

Nut-and-bolt fastening doesn't involve much complexity when it comes to drilling holes. A single-size hole through each piece does the trick. What size hole? The same size as the bolt—just drill a ⅜" hole for a ⅜" bolt, for instance. (Our chart shows the hole sizes to drill when you're using numbered machine screws.)

To determine bolt length, just measure the thickness of the assembled parts. Then add enough to allow for the nut and washers. The bolt should extend a couple of threads beyond the nut, too. Adding 1½-2 bolt diameters to the measured thickness will be about right—the nut is usually about a bolt diameter thick.



COMMON BOLT SPECIFICATIONS

Type	Dia	Drill	Fine thread	Coarse thread	Wrench size
Machine screws	#4	1/8"	48	40	1/4"
	#6	2/64"	40	32	5/16"
	#8	11/64"	36	32	11/32"
	#10	13/64"	32	24	3/8"
	#12	7/32"	28	24	7/16"
Bolts	1/4"	1/4"	28	20	7/16"
	5/16"	5/16"	24	18	1/2"
	3/8"	3/8"	24	16	9/16"
	7/16"	7/16"	20	14	5/8"
	1/2"	1/2"	20	13	11/16"

RESTAURANT IN THE ROUND

Turners and birds both will love it

We used these tools and supplies:

Stock
1×12×48" (nominal dimensions) cedar or redwood, 2½×2½×12" pine or fir.

Lathe equipment
Spur drive center, rotating cone tail center, 3-6" faceplate.

Tools
⅛" parting tool; 5/16", ⅜", and ½" gouges; ½" and 1" skews.

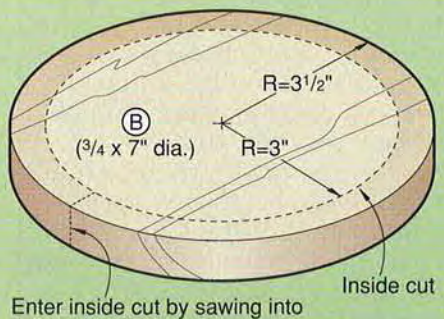
Lathe speeds
When truing the discs, particularly the large one, run your lathe at 500-800 rpm. Increase the speed to 1200-1500 rpm for the profile turning.

Expect a bevy of birds to gather 'round this clever feeder, which combines a few simple turnings with a section cut from a plastic pop bottle. Use rough cedar for a rustic look, or build one from redwood.

From ¾"-thick cedar or redwood stock, bandsaw or scrollsaw six discs, one 11" in diameter, two 9", one 7", one 6", and one 3". (We cut our cedar circles from a 1×12×48" board, even allowing for waste around knots.)

On the 7" disc, draw a line ½" in from the edge and parallel to it, creating a 6" circle and a ½"-wide ring around the outside, shown in the Cutting the Ring drawing. Cutting parallel to the grain, bandsaw in from the edge to separate the disc and the ring. Or, drill a blade start hole, and scrollsaw it.

Glue closed the entry cut through the ring. (We used cyanoacrylate adhesive. Woodworker's glue or epoxy would work also, but you'll need to clamp the ring with a band-type clamp or large rubber band.) Drill a ⅜" hole through the center of each disc.



CUTTING THE RING

Chop a pop bottle to make the cylinder

Wash out a 2-liter plastic pop bottle—either a clear or tinted one will work fine. With a utility knife, slice the straight-sided center section from the bottle, cutting where shown in the Plastic Seed Holder illustration.

Drill or punch a series of ⅛" holes around each end where shown in the illustration. Then, wrap a piece of ¾"-wide masking tape around one end of the plastic cylinder, flush with the edge.

Following the full-sized pattern *right,* draw two seed openings on the tape on opposite sides of the cylinder. Cut them out with scissors or snips, and remove the tape. Set the feeder cylinder aside now while you turn the wooden parts for the top and bottom.

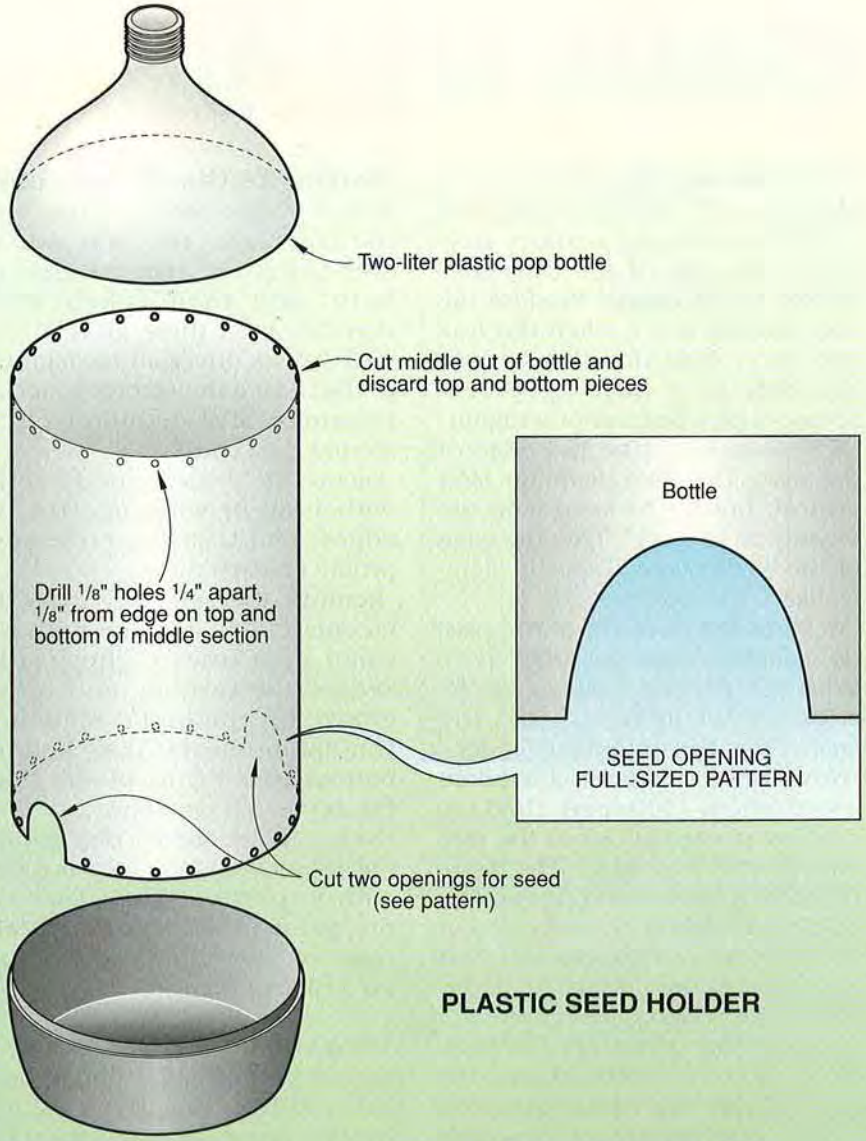
Make a faceplate for the discs

Attach a ¾"-thick, 8"-diameter scrapwood auxiliary faceplate to a metal faceplate 3-6" in diameter. Round down the wooden disc's edge, and turn the face true.

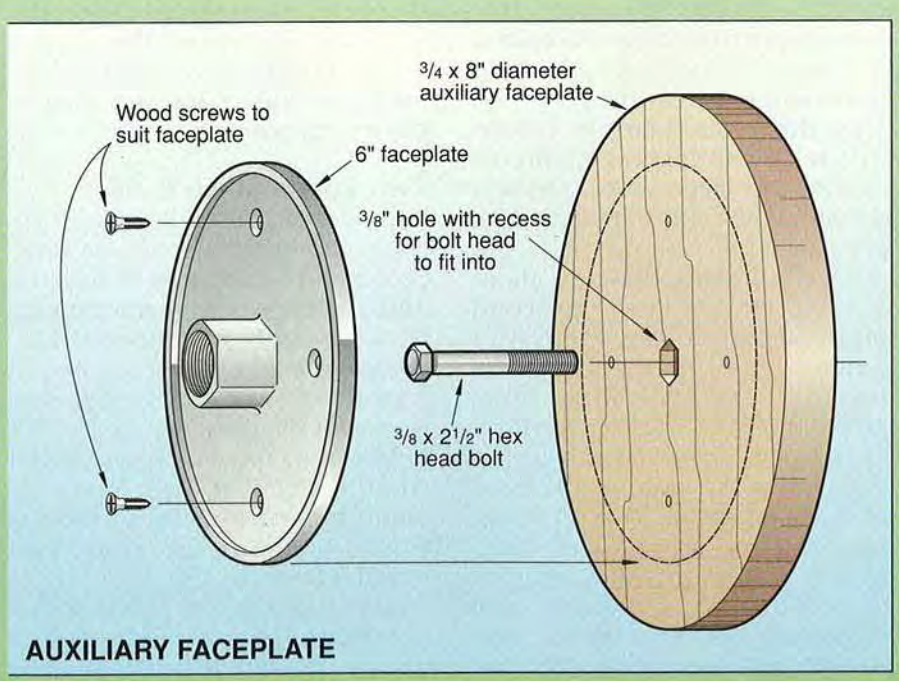
With the assembly still mounted on the lathe, bore a ⅜"-diameter hole through the center of the wooden faceplate. Start by pushing a small gouge into the center of the rotating workpiece (we used a 5/16" miniature turning gouge—other sizes also would work). Enlarge the hole to fit a ⅜×2½" hex-head bolt.

Scribe or draw index marks on the lathe faceplate and the auxiliary faceplate, and remove the wooden one. Counterbore the backside of the wooden faceplate to accept the head of the bolt. Insert the bolt through the hole from the back of the auxiliary faceplate, and epoxy it in place, keeping the threaded end perpendicular to the front surface. After the glue cures, align the marks, and reattach the wooden faceplate to the metal one. Remount the assembly on the lathe

Continued


Two-liter plastic pop bottle
Cut middle out of bottle and discard top and bottom pieces
Drill 1/8" holes 1/4" apart, 1/8" from edge on top and bottom of middle section
Bottle
SEED OPENING FULL-SIZED PATTERN
Cut two openings for seed (see pattern)

PLASTIC SEED HOLDER


3/4 x 8" diameter auxiliary faceplate
Wood screws to suit faceplate
6" faceplate
3/8" hole with recess for bolt head to fit into
3/8 x 2 1/2" hex head bolt

AUXILIARY FACEPLATE

RESTAURANT IN THE ROUND

Turn the big disc first

Slide the 11" disc onto the bolt extending from the auxiliary faceplate. The top of the disc goes against the faceplate. Because the bolt threads don't reach the bottom face, slide the 3" disc onto the bolt as a packing piece. Secure with a hex nut or wingnut.

With a gouge, true the edge of the disc. The final diameter isn't critical, but try to keep it in the vicinity of 10½–11". True the edge of the 3" disc, too. Taper it slightly, like a cork stopper.

Measure the diameter of the plastic cylinder (ours measured 4¼"). With the parting tool, cut a ⅛"-wide groove about ¼" into the face of the disc to fit the cylinder.

Now, run the lathe at a medium speed (about 1000 rpm). Hold the cylinder perpendicular to the disc with the top toward it. (The top is the end without seed openings.) Briefly and lightly press the end of the cylinder into the groove. Heat generated by friction will melt the plastic, forming a rolled edge.

Remove the disc from the faceplate, and turn it over, placing the grooved side against the faceplate. Instead of using the nut to secure it this time, drive a pair of #6x1¼" drywall screws into the disc through the back of the faceplate. (We were able to do this without dismounting the faceplate.)

Slide the 3" disc onto the centerbolt with the largest diameter against the larger disc. Draw a pencil line around the small disc, and slide it off.

With the parting tool, cut about ⅛" deep straight into the wood inside the pencil line. Then, with a gouge, cut a hole through the disc to fit the 3"-diameter plug. Don't try for a tight fit; allow about 1/16" clearance all around.

Now, turn the edge to the cove profile shown on the *opposite page.* A ½" gouge will do the job. Be sure to form the smallest diameter on the top of the disc—the side facing out. Remove the disc from the faceplate.

Getting to the bottom of it

Slide a 9" disc then a 6" one onto the faceplate, the best side of each facing out. Align the grain on both, and then fasten them together with three #6x1¼" drywall screws driven in through the 6" disc. Place the screws inside an imaginary 2½"-diameter circle around the center.

Secure the discs to the faceplate with a nut or wingnut. True the edges, and turn the cove edge profile on each piece.

Remove the assembly from the faceplate, and replace with the small disc toward the inside. Secure the turning, and turn a groove for the bottle section as you did on the 11" disc. Roll the bottom edge of the plastic cylinder as you did previously.

Next, center the 7" ring around the groove. Glue it into position with waterproof glue. Turn the ring to the profile shown *opposite page.* Be careful as you work on the inside of the ring.

Turn the lid for the feeder

Slide the remaining 9" and 6" discs onto the faceplate as you did previously. Screw them together, and turn the edge profiles as before.

Turn the assembly around on the faceplate, and center the 3" plug on the underside by sliding it on over the bolt. Glue the plug in place with waterproof glue.

Two finials finish it off

Remove the faceplate from the lathe, and install a spur-type drive center and a tail center to turn the finials. A cone-type revolving center will work best in the tailstock.

Locate the center on each end of your 2½×2½×12" stock. (For contrast with the discs, we turned our finials from fir, which we sawed from a piece of 4×4. You also could laminate material for the finials.) Mount the stock and round it down to 2⅜" diameter.

Lay out two finials on the cylinder, using the full-sized template on the *opposite page.* Here's one way to do it: Place them base-to-base, turning the top of the first one 2" from the headstock end of the cylinder. Leave about ¼" between the bottoms of the bases.

Turn the sphere with a gouge or 1" skew, working from the largest diameter down. The bullseye pattern formed by the woodgrain will aid you in turning a true sphere rather than an egg. Just watch for a round target.

After shaping both finials, turn a small-diameter tenon (about ¼" works fine) at the top of each sphere and between the bases. Remove the workpiece from the lathe, then cut off the waste and separate the turnings from each other with a backsaw.

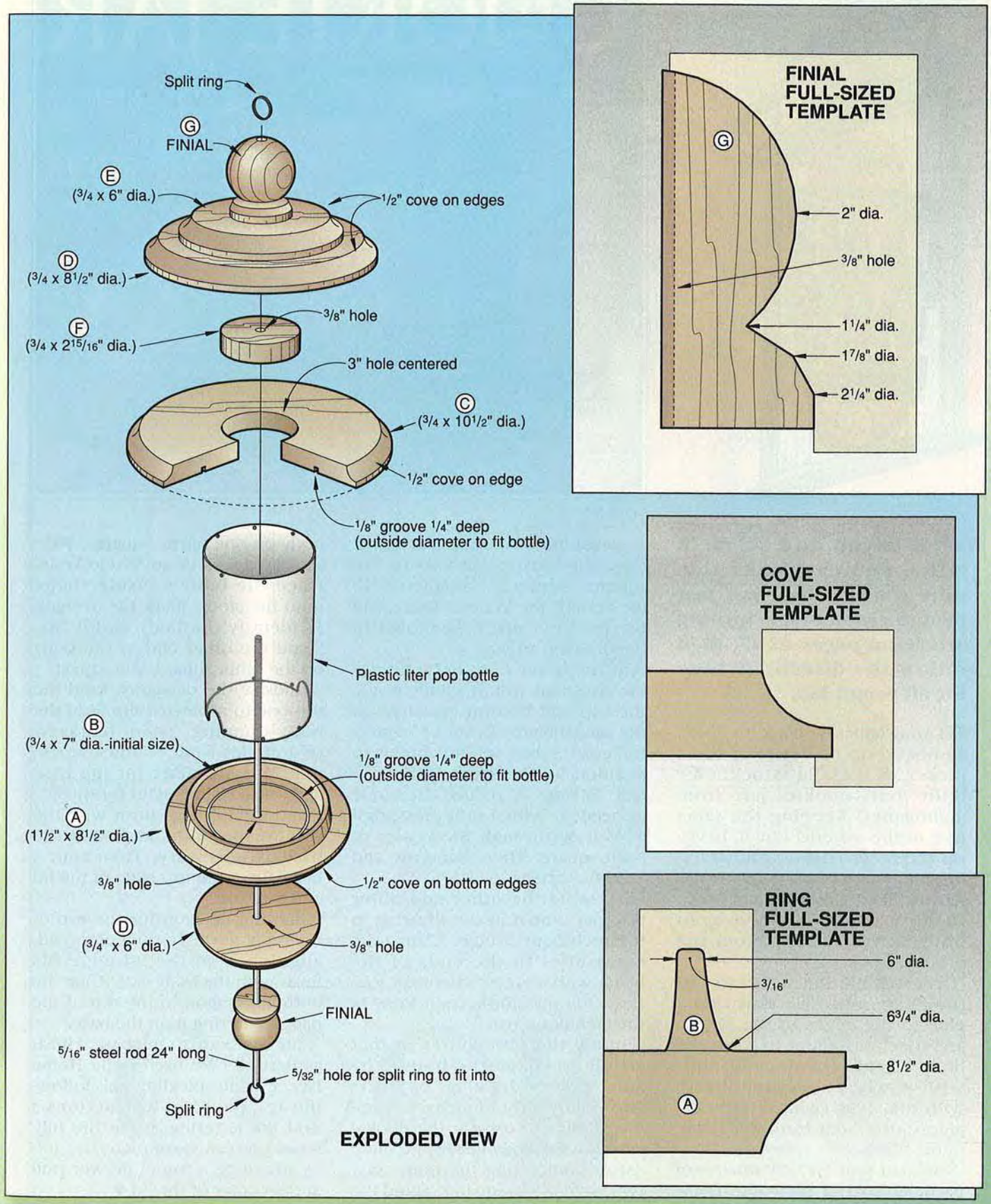
Now, drill the ⅜" hole through the center of each finial. Grip the turning with a handscrew clamp to drill the hole with a drill press.

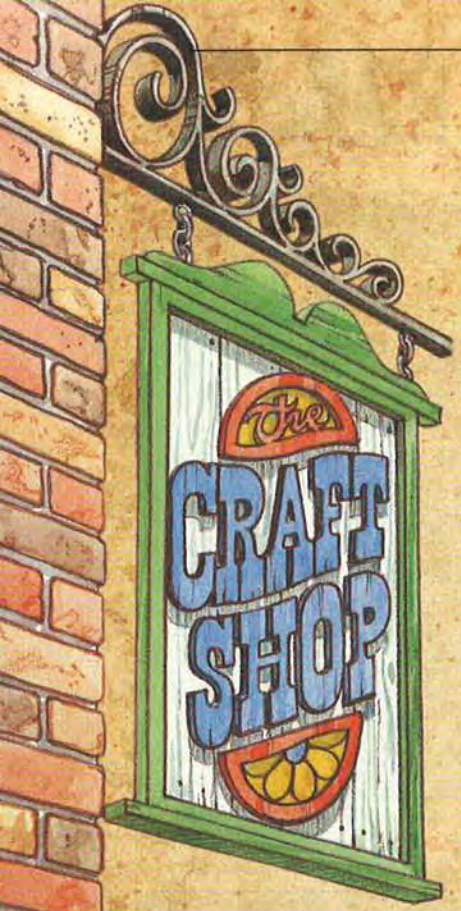
Put it all together

With epoxy, glue the plastic cylinder into the grooved discs. The top, the end without the seed openings, fits into the groove on the largest disc. Fill the groove with epoxy, then insert the cylinder into it. The epoxy will flow through the holes around the rim to aid in making a strong joint. Glue on the bottom the same way. Glue one finial to the lid, the other to the bottom. Align the holes using the auxiliary faceplate.

Assemble the bird feeder on a ⅜"-diameter brass, aluminum, or galvanized steel rod 36" long. First, drill a 5/32" hole ¼" from each end of the rod. Slide a 1"-diameter split-ring key ring into one hole. Place the bird feeder body on the rod, finial pointing down, and slide it down. Place the lid on the rod, and install the other ring in the hole at the top of the rod. Hang the feeder by the top ring. To fill it up, slide the lid up the rod and pour seed in through the hole in the top of the feeder.

Project Design: Ron Pavelka
Illustrations: Kim Downing
Photograph: John Hetherington


Split ring
G
FINIAL
E
(3/4 x 6" dia.)
1/2" cove on edges
D
(3/4 x 8 1/2" dia.)
3/8" hole
F
(3/4 x 2 15/16" dia.)
3" hole centered
C
(3/4 x 10 1/2" dia.)
1/2" cove on edge
1/8" groove 1/4" deep
(outside diameter to fit bottle)
Plastic liter pop bottle
B
(3/4 x 7" dia.-initial size)
1/8" groove 1/4" deep
(outside diameter to fit bottle)
A
(1 1/2" x 8 1/2" dia.)
3/8" hole
1/2" cove on bottom edges
D
(3/4" x 6" dia.)
3/8" hole
FINIAL
5/16" steel rod 24" long
5/32" hole for split ring to fit into
Split ring
EXPLODED VIEW
FINIAL
FULL-SIZED
TEMPLATE
G
2" dia.
3/8" hole
1 1/4" dia.
1 7/8" dia.
2 1/4" dia.
COVE
FULL-SIZED
TEMPLATE
RING
FULL-SIZED
TEMPLATE
6" dia.
3/16"
B
6 3/4" dia.
8 1/2" dia.
A



ALL-STAR COOKIE JAR

YOU "TURN" IT WITH YOUR ROUTER

Even if you don't have a lathe, you can make this nifty round cookie jar. Just read the router-table turning article on *pages 42-47*, then follow the directions here for all-round fun.

Tilt your tablesaw blade to 22½°, and bevel-rip one edge of three pieces of ¾×3×24" stock. (We built our cookie jar from mahogany.) Keeping the same face of the material down, bevel-rip the other edge to the staves' finished width of 2¾" (2⅛" on the narrow face). Reset the saw blade to vertical, and crosscut eight body staves 7" long from the beveled stock.

Dry-assemble the staves to test their fit. Apply woodworker's glue to the edges of the staves, and assemble them to form the body blank. Wrap the assembly with waxed paper, and clamp with strap-type clamps. Clean the glue squeeze-out from the inside of the blank.

Now, cut four ¾×7×7" squares of particleboard or plywood. Draw diagonal lines to locate the center on each square. On two of the squares, scribe a 7"-diameter circle around the center. These will be the outer discs, as shown in the drawing on *page 47*.

On the other two, draw circles for discs that will fit snugly inside the top and bottom openings of the staved blank. Draw a 5"-diameter circle, and set the blank in position to check the fit by eyeball. Enlarge or reduce the circle as needed. With a drill press, drill a ¼" hole through the center of each square. Then, bandsaw and sand the circles.

Assemble the inner and outer discs as shown in the drawing in the technique article. Clamp the assemblies to the ends of the blank with a ¼×10" all-thread rod, shown in the Side-Section View in the technique article.

Follow the procedures in that article to shape the body. The Side Section drawing, *opposite page*, shows the dimensions and bit profiles to use for the cookie jar. Sand the body inside and out.

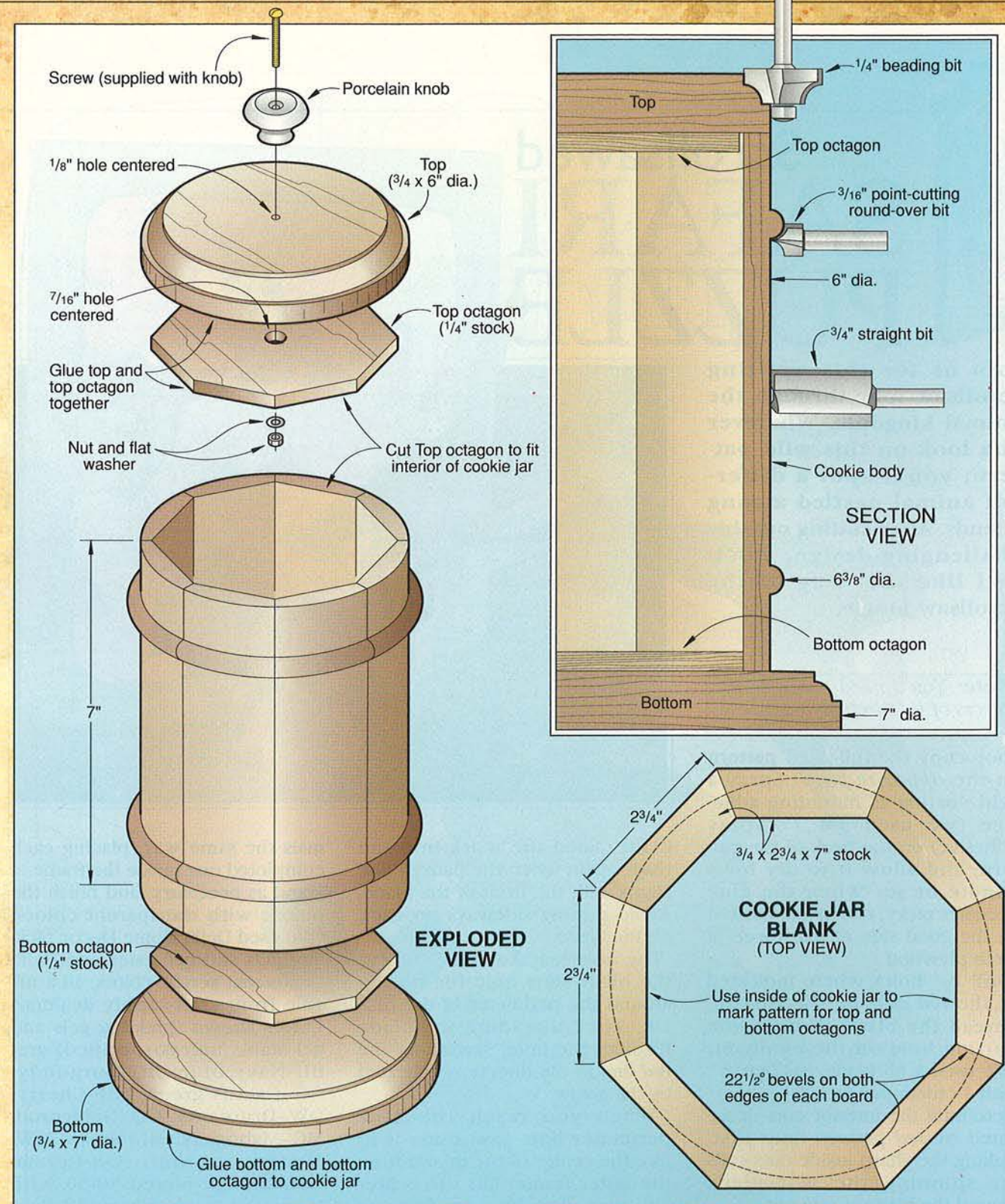
After completing the body, saw two ¼×5¼×5¼" squares. Stand the body on one of the squares. With a sharp pencil or an X-Acto knife, trace the body's inside shape onto the stock. Mark the octagon to identify the body end it fits. Stand the other end of the body on the other square, and repeat.

Bandsaw the octagons. Sand the top one to achieve a slip fit in the body opening. Then, bandsaw two circles from ¾"-thick stock, one 7" in diameter for the base and one 6" in diameter for the lid.

Sand the lid edge flush with the side of the body, and sand the base as necessary. Then rout a bead along the top edge of the lid and the base.

Glue the octagon for the top of the body to the bottom of the lid, aligning it so the lid edge fits flush with the body side. Glue the bottom octagon to the top of the base, centering it on the base.

Glue the body to the base. Finish as desired (We used Delta Home Decor white pickling gel, following the package instructions.) Add the lettering, using the full-sized pattern. Complete the job by installing a round drawer pull at the center of the lid.

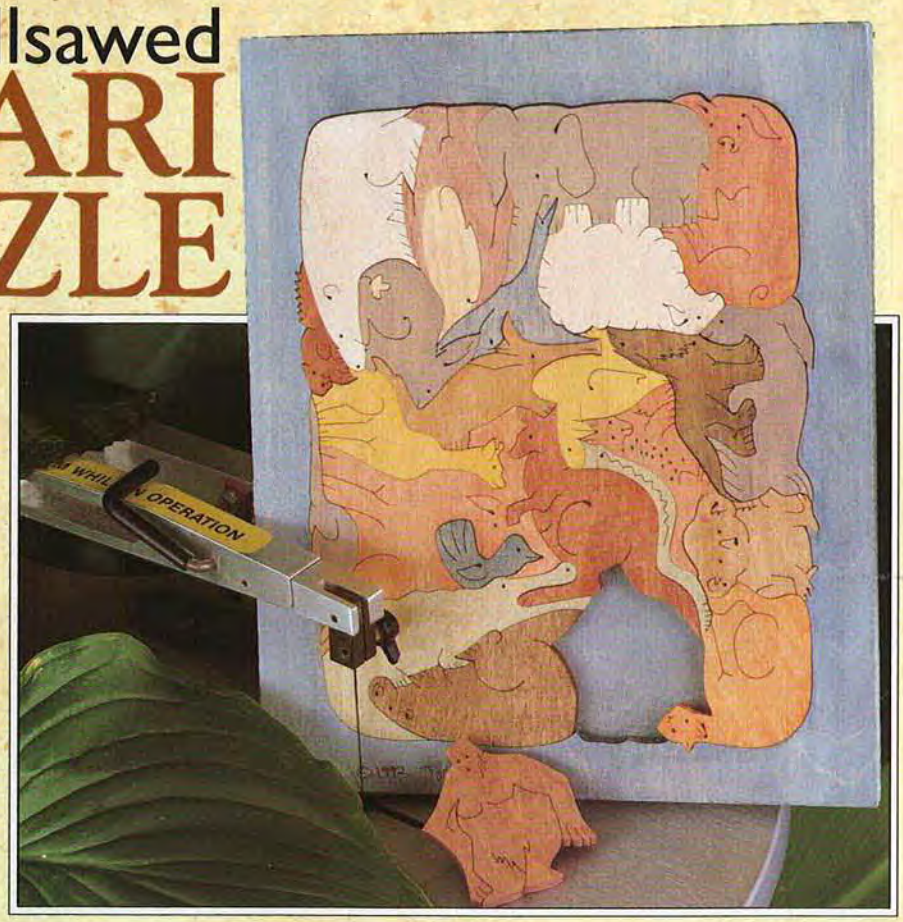


COOKIES

Project Design: James R. Downing Illustrations: Kim Downing Photograph: John Hetherington

CRAFT SHOP

Scrollsawed SAFARI PUZZLE



Join us for this exciting scrollsaw tour through the animal kingdom. Wherever you look on this wild pattern, you'll spot a different animal nestled among friends. After cutting out this challenging design, you'll feel like the King of the Scrollsaw Jungle.

Note: *You'll need two 8½×10" pieces of ¼" birch plywood.*

Photocopy the full-sized pattern on the *opposite page*. Spray a light coating of mounting adhesive (we used 3M 77 Spray Adhesive) on the back of the pattern, and allow it to dry for a minute or so. When the glue becomes tacky, center the pattern on the good side of one piece of birch plywood.

Drill 1/16" holes where indicated by the *red* dots on the pattern. Thread the blade through the starting hole on the elephant. (We used a #5 blade, .037×.015", with 14 teeth per inch.)

Scrollsaw the interior cuts designated by *red* pattern lines first. Making the sharp inside cuts calls for spinning the workpiece around the blade as you cut.

To do this, stand directly in front of the saw, and feed the workpiece steadily into the blade. When you reach a sharp turn, reduce the feeding pressure and simultaneously spin the workpiece sharply, pivoting on the blade. Feed the work into the blade again when the pattern line aligns with the front of the blade. Avoid putting sideways pressure on the blade.

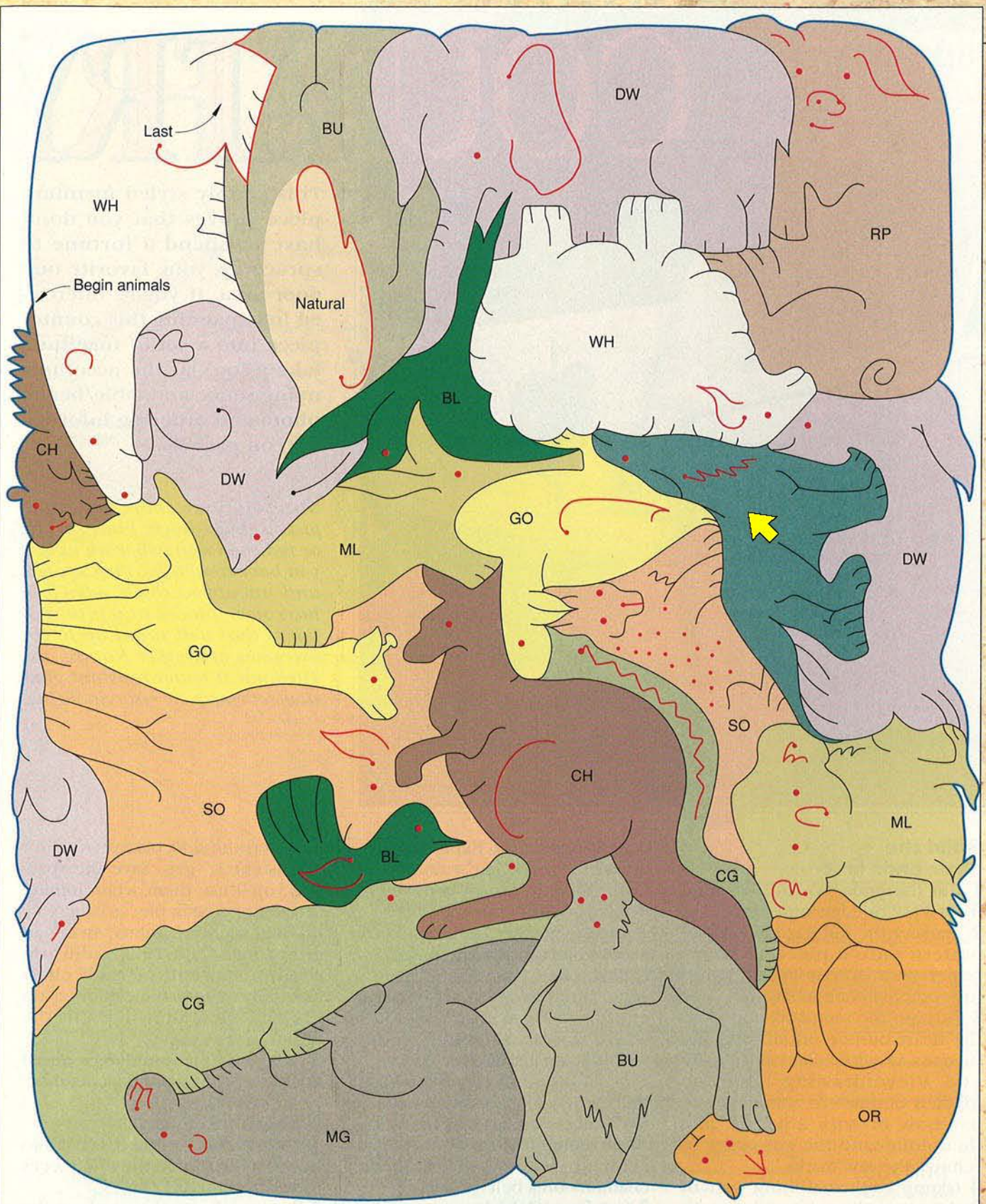
The hole marked "Last" acts as the blade-start hole for sawing around the perimeter of the puzzle. After threading the blade through the hole, saw along the *red* line in the direction indicated by the arrow.

When you reach the *blue* perimeter line, saw along it to free the center of the puzzle from the outer frame. Lift the center out, then glue the outer frame to the other piece of plywood.

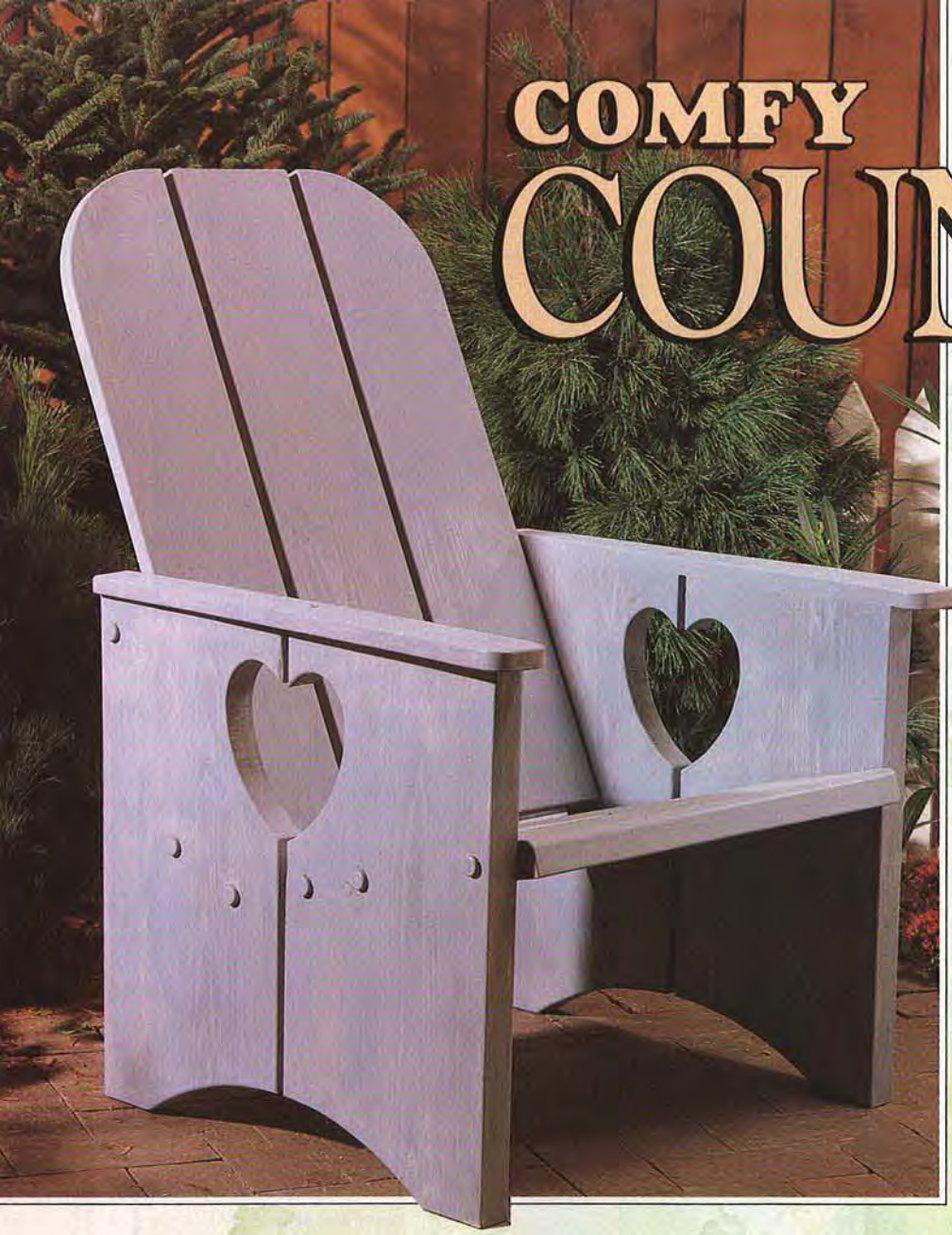
Now, cut out the animals. From the point marked "Begin animals," cut around the polar-bear, sawing the short cuts for the mouth and toes as you come to them. Cut out the rest of the animals the same way, placing each completed one inside the frame.

Sand as necessary, and finish the puzzle with transparent colors. (We used Delta Home Decor pickling gels and gel stains and Delta Ceramcoat acrylic colors, all available from craft-supply dealers.) Colors shown (pickling gels and gel stains unless specified) are: BL-Navy blue; BU-Burgundy; CG-Cactus green; CH-Cherry; DW-Driftwood; GO-Goldenrod; MG-Mahogany; ML-Maple; MW-Modern walnut; OR-Ceramcoat orange mixed 50-50 with Home Decor neutral gel; RP-Rose pink; SO-Sunset orange; WH-Desert white. Stain the back and frame with a 50-50 mix of Delta Ceramcoat Black green and Home Decor neutral gel. Wipe on Desert white and wipe it off again to glaze the frame and back.

Project Design: © Peggy Johnston Photograph: John Hetherington Illustration: Kim Downing



FULL-SIZED PATTERN



COMFY COUNTRY

This simply styled furniture piece proves that you don't have to spend a fortune to spruce up your favorite outdoor area. If you're interested in expanding this country piece into a set of furniture, take a look at the accompanying settee and table/bench photo and ordering information on page 76.

Note: *For our chair, we hand-picked fir 2× stock. Pine, spruce, or redwood also will work well. If you have trouble locating straight and uncupped stock, edge-join narrower pieces to width. For joints that will stand up to the extremes of Mother Nature, use Titebond II water-resistant glue, slow-set epoxy, or resorcinol glue.*

Print this article

Build the chair ends first

1 Cut the ends (A) to 20¾" long from 2×12 or edge-joined stock.

2 Transfer the full-sized heart half-pattern onto a piece of heavy paper or poster board. Cut the full-sized template to shape.

3 Position the template, and trace the heart outline on all four end pieces (A) where located on the End View drawing. Cut the marked outlines to shape on the bandsaw or with a jigsaw, and then drum-sand the cut edges to remove the saw marks.

4 Clamp each matching pair of 2×12s together, heart edge to edge, with the top and bottom edges flush. Now, using the dimensions on the Exploded View drawing, mark the two dowel-hole locations on one face. Remove the clamps. Using a square, transfer the lines to the inside edge of each end piece.

5 Check that you're square to the edge, and bore ¾" holes 1½" deep centered from edge to edge where marked. (We used an electric drill and a spade bit.)

6 Set a stop, and crosscut four pieces of ¾" oak dowel stock to 3⅜" long. For ease of insertion, sand a chamfer on each end of each dowel. (We formed our chamfers on a belt sander.)

7 Cut four ⅜"-thick spacers. Glue, dowel, and clamp both chair ends together, placing the ⅜" spacers between the end pieces (A) for a consistent ⅜" gap. Save the spacers; you'll use them when joining the seat and back pieces later.

8 Using trammel points, swing an arc to mark the 15⅜" radius on the bottom end of each chair assembly where dimensioned on the End View drawing. Cut the arcs to shape.

9 Sand a slight round-over on all edges of each chair end assembly.

Now, for the seat

1 Cut the two seat pieces (B, C) to length. (We ripped the two pieces to width from 2×12 stock.)

2 Rout a ½" round-over along the top front edge of the seat front piece (B).

Continued

CHAIR

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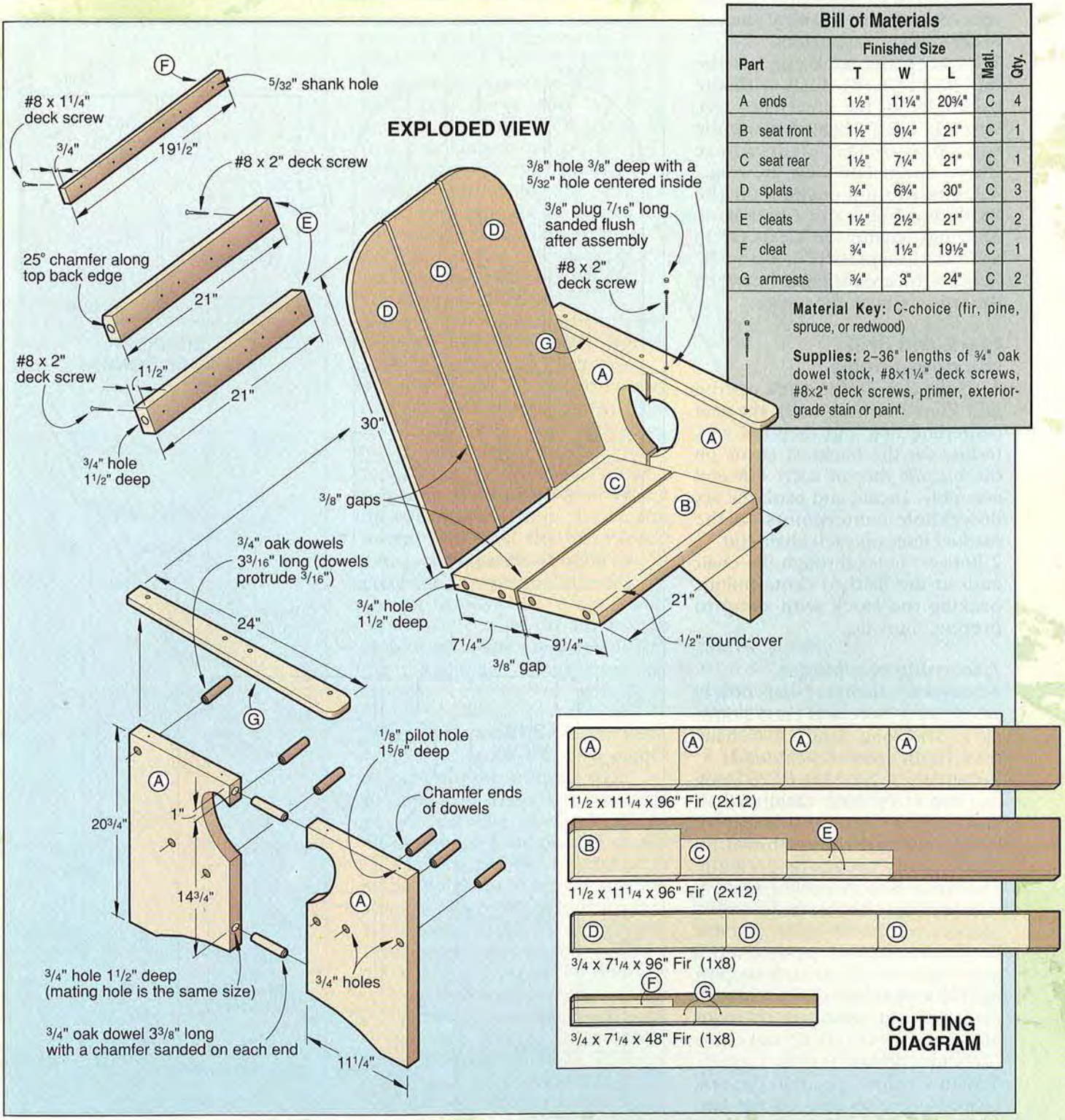


Bill of Materials

Part	Finished Size T	W	L	Matl.	Qty.
A ends	1½"	11¼"	20¾"	C	4
B seat front	1½"	9¼"	21"	C	1
C seat rear	1½"	7¼"	21"	C	1
D splats	¾"	6¾"	30"	C	3
E cleats	1½"	2½"	21"	C	2
F cleat	¾"	1½"	19½"	C	1
G armrests	¾"	3"	24"	C	2

Material Key: C-choice (fir, pine, spruce, or redwood)

Supplies: 2–36" lengths of ¾" oak dowel stock, #8×1¼" deck screws, #8×2" deck screws, primer, exterior-grade stain or paint.

COMFY CHAIR

Build the backrest next

1 Cut the backrest splats (D) and backrest cleats (E, F) to size.

2 Mark a 6" radius on two of the backrest splats where shown on the Chair Back drawing. Cut the corners to shape and sand smooth to remove the saw marks.

3 To keep the back edge of the middle cleat (E) flush with the back edge of the chair ends (A), bevel-rip a 25° chamfer along the top edge of the cleat where shown on the End View drawing.

4 Using the dimensions on the Exploded View and Chair Back drawings, clamp the cleats (E, F) against the splats (D), using ⅜" spacers to create gaps between the splats. Check for square.

Mark and drill the dowel holes

1 Using the dimensions on the End View drawing, mark the seat centerline first and then the centerline for the backrest cleats on the *outside face* of each seat end assembly. Locate and mark the six dowel-hole centerpoints on the marked lines on each chair end.

2 Bore ¾" holes through the chair ends at the marked centerpoints, backing the stock with scrap to prevent chip-out.

Assemble the pieces

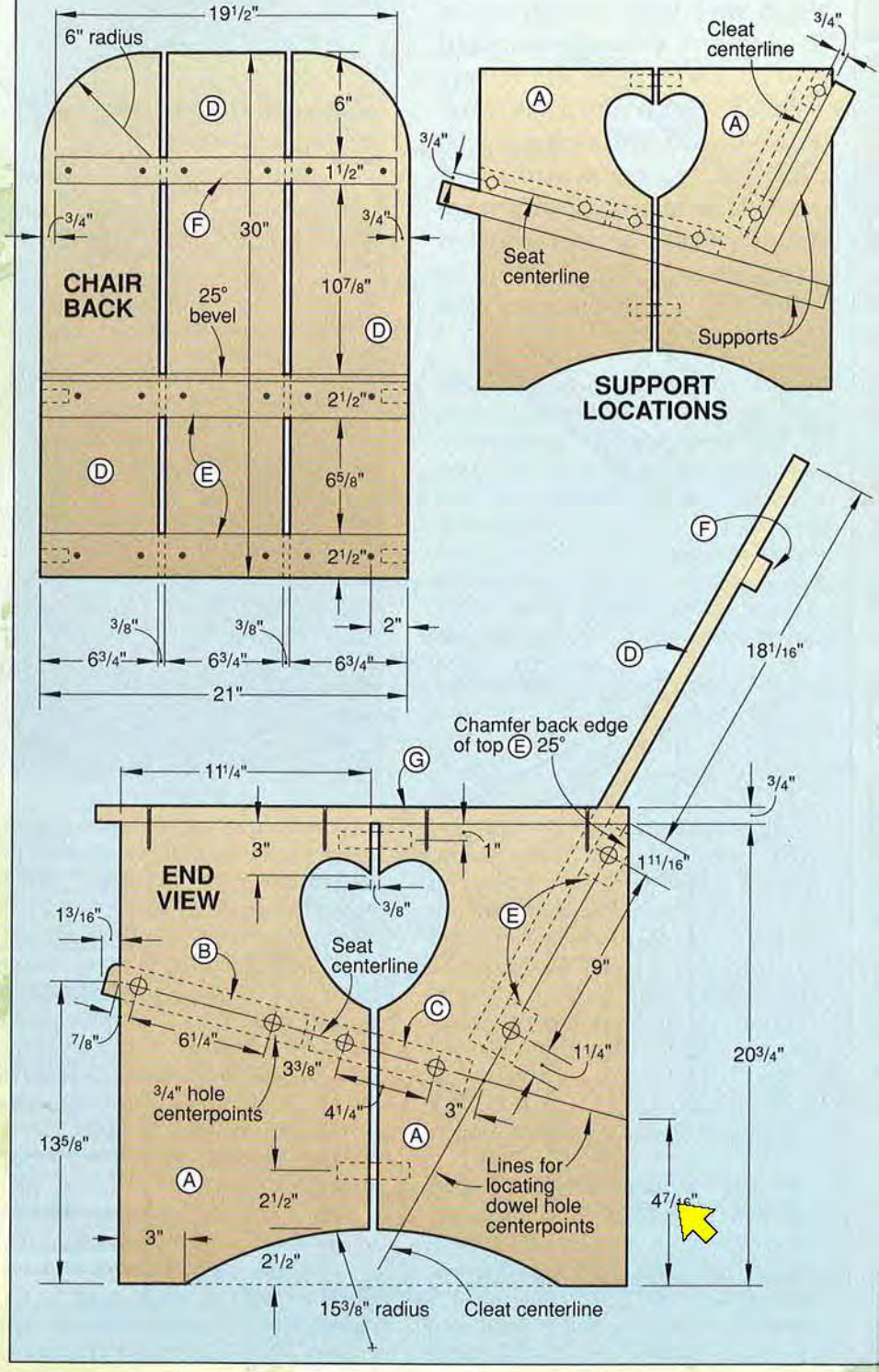
1 From ¾"-diameter oak dowel stock, set a stop, and cut 12 dowels to 3⅜16" long. Sand a ⅜16" chamfer on both ends of each dowel.

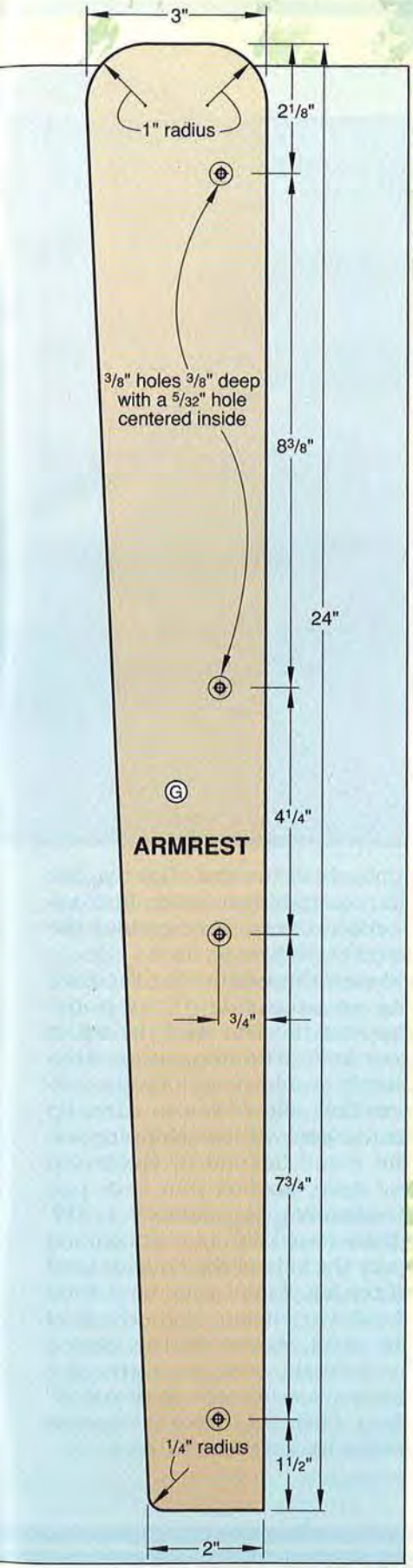
2 Cut two 1×2 scraps to 26" long and two to 14" long. Clamp one of each length to the inside face of each chair end where shown on the Support Locations drawing. The strips help center the ends of the seat and backrest assembly pieces over the ¾" holes. [To test the locations, we positioned a piece of 2× stock on each support to check that the holes in the end pieces would center on the ends of the seat pieces (B, C) and cleats (E) before drilling.]

3 With a helper, position the seat pieces where located on the End

Want to build a settee and a table/bench to match?

If you're interested in building the matching pieces shown at *left*, send $9.95ppd. to WOOD PLANS–Country Comfy Trio, P.O. Box 9255, Dept. WD24, Des Moines, IA 50306, or call 1-800-572-9350 for VISA or Mastercard orders.





View drawing. Slip the ⅜" spacers between the pieces for a consistent gap. Clamp the seat pieces firmly between the chair ends.

4 Chuck a ¾" spade bit into a portable electric drill. Using the previously bored holes in the end sections as guides, bore a pair of 1½"-deep holes squarely into each seat piece end. As soon as you've bored the first hole, insert one of the 3 3⁄16"-long dowels into the hole to help steady the seat piece for boring the next hole. Do not insert the dowel more than ½" into the seat piece; you may have trouble removing it if you insert it all the way.

5 Repeat the procedure to position and drill the ¾" holes in both ends of the backrest cleats (E).

6 Remove one of the 3 3⁄16"-long dowels. With a small brush, coat the inside of the hole with glue. To prevent marring the chamfered dowel end, use a rubber-tipped mallet to slowly drive the dowel into the hole. Drive the dowel until just the chamfered end protrudes. Be careful not to drive the dowels too far—they're almost impossible to back out. Immediately wipe off any excess glue. Repeat for each dowel. Let the glue dry and then remove the clamps.

Now, let's add the armrests

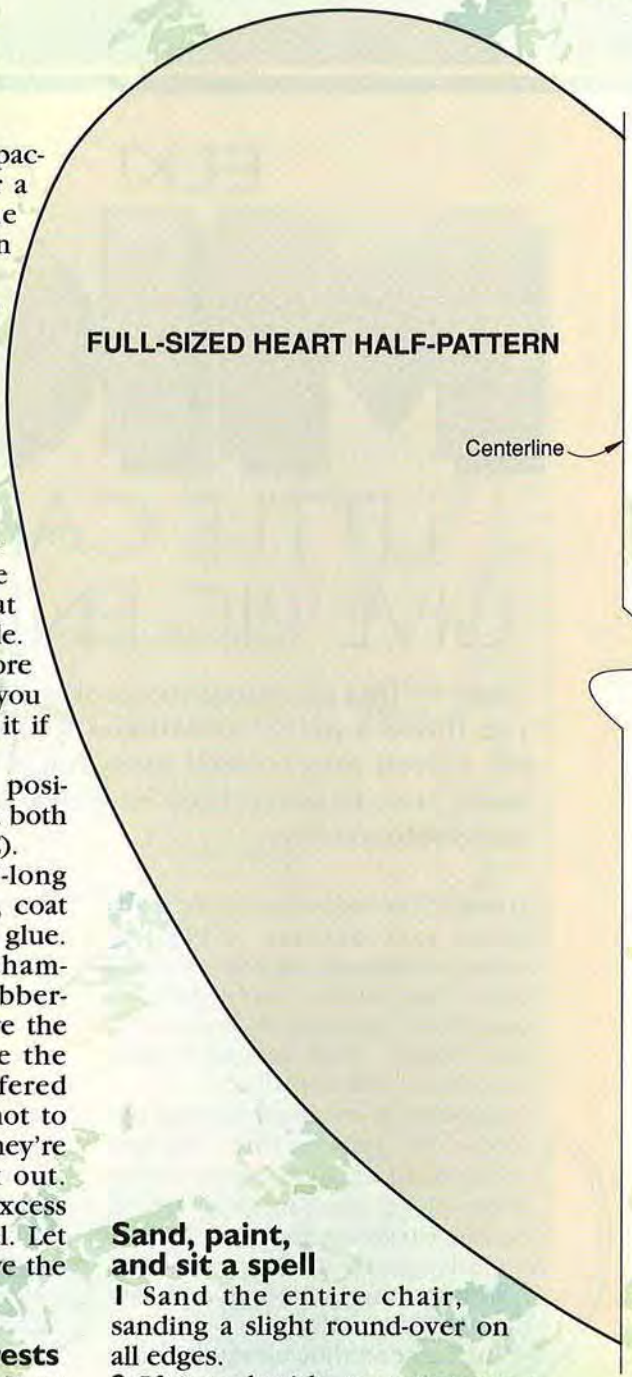
1 From ¾" stock, cut two pieces to 3×24" for the armrests (G).

2 Using the dimensions on the armrest drawing, mark the profile on one piece and cut it to shape. Use the first piece as a template to mark the shape onto the second armrest, and then cut it to shape.

3 Mark the hole centerpoints. Drill and counterbore the holes.

4 Screw the armrests to the tops of the end assemblies (A).

5 Plane or resaw a piece of stock to 7⁄16" thick, and use a plug cutter to cut ⅜"-diameter plugs. Plug the holes, and sand the plugs flush with the top of each armrest.



Sand, paint, and sit a spell

1 Sand the entire chair, sanding a slight round-over on all edges.

2 If you decide to paint your chair, an oil-based enamel or water-based latex will provide adequate protection. Regardless of your paint selection, be sure to apply a prime coat that's compatible with the top coat. Also, be sure to apply several coats to the porous end grain.

For a more natural look, finish the chair with an exterior house stain, and then apply several coats of spar varnish.

Produced by Marlen Kemmet
Project Design: James R. Downing
Photographs: Wm. Hopkins
Illustrations: Roxanne LeMoine

EEK! EEK!

MICE

LITTLE CARVINGS GIVE BIG ENJOYMENT

"They're just the thing to decorate the cheese tray next time you throw a party," Oklahoma woodcarver Bill Payne says of his carved mice. You'll have fun with them right from the start, too, because they're quick and easy and just plain enjoyable to carve.

Transfer the side-view pattern for either the crouching or begging mouse onto your carving stock. "I paste the photocopied pattern onto light cardboard, and cut it out. Then, I draw around it onto the wood," Bill explains.

Bandsaw or scrollsaw around the side-view pattern line. For the crouching mouse, fasten the waste pieces back in place on the cutout (masking tape works fine for this). Trace the top-view pattern onto the top edge, and saw the top-view outline.

Pencil a centerline along the edge of each cutout. This will help you avoid carving a lopsided mouse. Now, you're ready to carve.

Start with the crouching mouse

With your knife, shape the mouse's body from the ears back. Keep the curvature from the centerline to each side approximately the same as you round the back of the body. You'll come close enough just eyeballing it. Leave the sides straight for now; we'll come back to the feet. Do carve the dip for the neck right behind the mouse's ears.

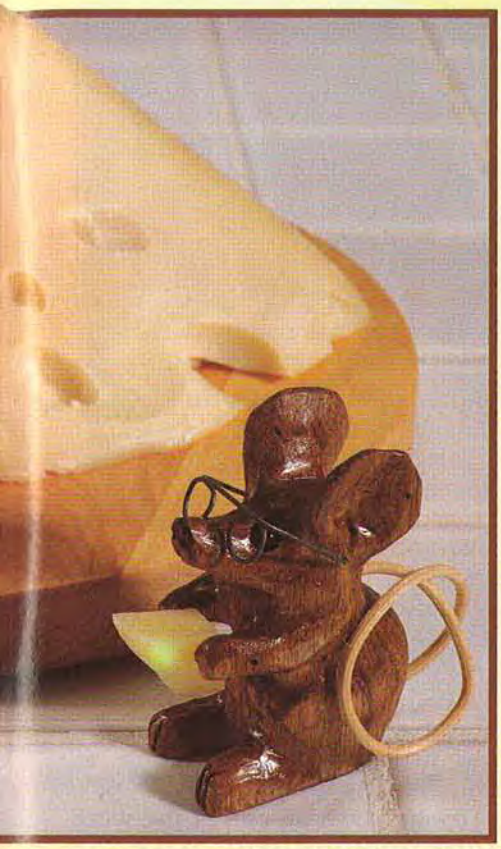
Next, carve the top of the head between the ears. Remove the waste with your knife or a small gouge. Make the top of the head slightly lower than the highest point on the back—about 1/16" lower would be fine. Blend the top of the head, the neck, and the back into a smooth curve.

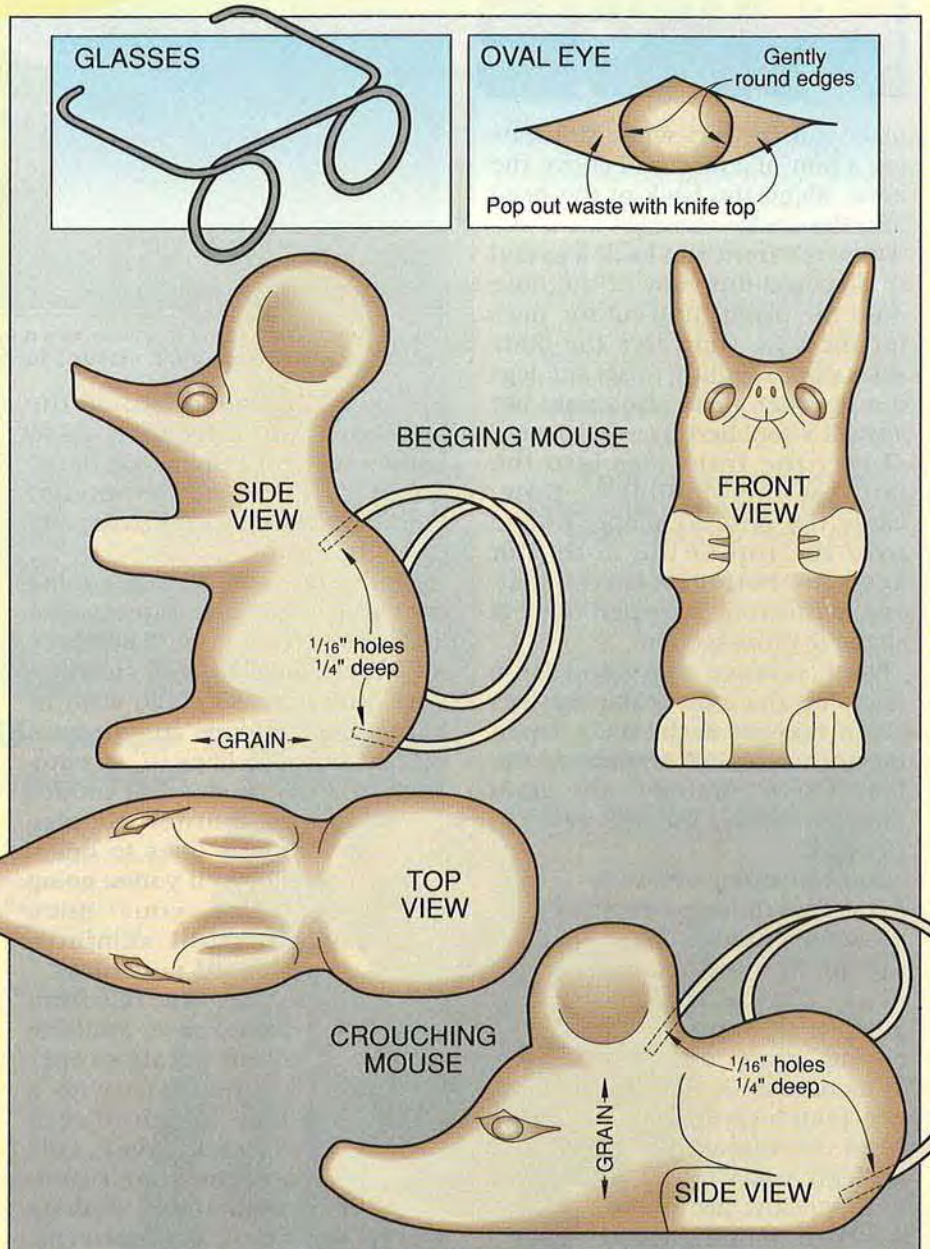
Blend the ears into the top of the head. Form a deep, smooth curve from the top of one ear, down to the top of the head, and back up to the tip of the other ear. Each ear should be about 1/3 the width of the head at the widest point. Leave the outside of the ears straight and flush with the sides of the head.

Shape the nose by rounding off the top corners and blending them into the face. Form a slight peak on the face, running from the hollow between the ears to the tip of the nose. Taper the bottom edges inward slightly, but don't round them under. In cross-section, the nose resembles the letter D lying on its back.

Sketch the outline for the hind leg on each side of the body. Stop-cut the line with the tip of your knife. The stop cut, which is simply an incision along the pattern line, allows you to carve up to the line without chipping out the wood beyond it. Cut about 1/16" deep, holding your knife perpendicular to the surface.

With your knife or a gouge, cut away the side of the body in front of the leg. At the same time, form the lower jawline at the back of the head, shown by the shaded area on the pattern. Carve the mouse's midsection about 1/8" deep, blending it into the hollow on the back behind the ears.





Taper the back of the head into the mouse's midsection. Hollow out the ears with a gouge or the tip of your knife. Draw the eyes, shown above, on the sides of the face, taking care to locate them at the same height and distance from the nose. Cut along the upper and lower lines, then the sides of the eyeball. Pop out the waste in the corners with your knife.

Next, the begging mouse

Round the mouse's back side-to-side from the bottom of the blank to the neck. Keep the back centered on the centerline. Gently round the sides of the neck, but leave the back of the neck flat.

Carve away the waste between the ears. Go about ½" deep at the top of the head—deep enough to

Continued

We used these tools and supplies:

Stock
Bill often carves natural-finish mice from butternut, aromatic cedar, or mahogany. For painted mice, he chooses basswood. You'll need a piece of stock 1¼×2×3" for each mouse.

Knife
Bench-type carving knife
(Tools below are optional)

Gouge
No. 5 or 7, ¼–⅜"

V-tool
No. 12, ⅛"

EEK! EEK!

MICE

make outsize ears while still leaving a hint of a forehead above the nose. Blend the back of the head into the neck.

Draw the front and back legs and the tapered top view of the nose onto the blank. Stop-cut the lines for the legs, and carve the body sides down slightly to set the legs out in relief. (You also could use a small V-tool here.)

Taper the front legs into the body at the shoulders. Now, carve the nose to shape. Round over the top of the nose, but keep the bottom relatively flat, again forming a tipped-over D shape in cross-section.

Then, remove the wood from between the legs. Make the legs about ⅜" wide at the body, tapering to maybe 1/16" thinner at the feet. Carve carefully—the grain direction makes the legs easy to break.

You can carve oval-style eyes, like those on the crouching mouse. But, for the big-eyed, innocent beggar look, you'll want to put round eyes on your mouse. A 3/16" eye punch (available from carving-supply dealers) makes round eyes quickly; just press it straight into the wood, then rotate it.

Details, details, the tails

Look over your carvings and clean up any ragged cuts before adding the details. Sand the mouse now if you want a smooth surface without tool marks.

Using the tip of your knife, drill two nostrils about the size of a pinhead in the end of the nose.

Needle-nose pliers come in handy when forming the eyeglasses for the mice. A 3/16" drill bit shank makes a good mandrel for bending the specs.

Inscribe a U-shaped line on the bottom of the lower jaw (also known as the flat underside of the nose) to represent the mouth. Point the closed end toward the tip of the nose.

Finish your mice before adding the curlicue tail, one of their most distinctive features. The mice shown are finished with clear lacquer, but you also could stain or paint them. Before spraying on the lacquer, Bill likes to accentuate the eyes, nose, and mouth with a woodburner. He also woodburns lines to delineate toes. "If you're going to paint your mice white," Bill reminds, "paint the nose pink."

Make the tail from basket reed, available from craft-supply stores. Start with a 6-8" length of reed for each mouse. Drill holes the same size as your reed, about ¼" deep where shown on the patterns. Center the holes on the mouse.

For a straight tail, bend the reed, insert an end into each hole, and glue with cyanoacrylate adhesive. For a curly tail, soak the reed in water overnight. Coil the wet reed around a ½" dowel or other cylindrical form, and secure it with rubber bands. Allow the reed to dry overnight, and install as with the straight tail.

Here's lookin' at you

Finally, make a pair of glasses for each mouse. For each pair of spectacles, cut a 6" length of soft 20-gauge solid wire, such as steel picture frame wire or copper electrical wire. (If you don't have any of those, a straightened-out paper clip works pretty well.)

About 1½" from one end, form a loop about 3/16" in diameter. Wrap the wire around the shank of a 3/16" drill bit for a neat loop, as shown in the photo *above*.

Toward the long end of the wire, form another loop. Make the loops far enough apart to fit your mouse's nose (¼" spacing worked for both of our mice).

Place the glasses wherever you like them on the nose—either close to the eyes or nearer the end of the nose. Then, bend the ends of the wire back to form the glasses' temples. Mark the length to the approximate middle of the ear, then cut the wire about ⅛" longer on each side.

Bend the ends inward as shown in the illustration, *previous page*. Place the glasses on the nose, and mark the head by pressing the wire ends into the wood. Drill a small hole at each point, put the glasses on the mouse, and insert the ends into the holes. Glue with cyanoacrylate adhesive.♣

Project Design: © Bill Payne
Illustrations: Kim Downing
Photographs: John Hetherington

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HOW TO PROTECT OUTDOOR PROJECTS FROM THE ELEMENTS

Rain, shine, sleet, or snow may not stop the postman, but they will quickly ravage unprotected outdoor furniture projects. Fortunately, today's paints and coatings can do a fantastic job of shrugging off the elements. So what's the key to success? Selecting a product with all the right ingredients.

According to William C. Feist, a research chemist at the Forest Products Laboratory in Madison, Wisconsin, a successful outdoor wood coating should contain three ingredients: a water repellent, a mildewcide, and an ultraviolet light (UV) blocker. The label on the can will tell you if the product you select contains these elements. Here are your choices:

Deck stains do it best

For a clear or semi-transparent stain on your project, you can't beat the one-step, oil-based stains developed to protect outdoor decks, says Feist. These coatings penetrate the wood and will not crack or peel like paint. And you can rejuvenate them easily by brushing on a new coat every few years. Manufacturers offer a wide selection of colors, and you also can find stains that hide or minimize the green tint of pressure-treated wood.

Weather-resistant woods such as redwood, cedar, and teak will keep their natural wood colors longer with a clear penetrating stain. Even with a coating, however, these woods will eventually weather to a silver gray color.

Select a custom color

If you don't find a deck product with a stain color you like, try coating your project with a clear, oil-based penetrating sealer, and then follow up with an oil-based stain that has the desired color. The sealer will repel water but still allow an oil-based stain to adhere, says Feist. As with any finishing product, test these coatings on a sample board first.

Paints work well, too

For a solid color, Feist recommends an oil-based primer followed up with a high-quality exterior latex paint. Exterior paints contain mildewcides, and the paint film will repel water and damaging UV rays. You also can prime some projects with latex-based formulas, but if your project contains redwood or cedar, use a stain-blocking primer. These prevent the wood's natural resins from bleeding through the finish. To avoid chalking, choose a semi-gloss or high-gloss paint.

Although many manufacturers claim that one coat of an oil or latex product is enough, you're better off with two coats to start. Take special care to thoroughly coat end grain and joints—the most common entry points for water. Also, keep in mind that horizontal surfaces (like the arms of chairs) take more of a beating from sun and rain than do vertical surfaces, and may require additional coats.

Illustration: Jim Stevenson

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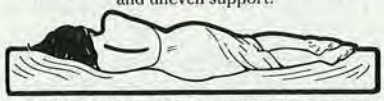

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31-460	4" Belt/Disc Sander	198	135
31-340	1" Belt/8" Disc Sander	268	204
31-080	1" Belt/5" Disc Sander	134	94
40-560	16" 2 speed Scroll Saw	266	178
11-990	12" Bench Drill Press	276	205
11-090	32" Radial Bench Drill Press	399	285
43-355	3/4" Shaper 1-1/2 HP	964	709
43-505	1/2" Bench Router/Shaper	399	275
22-540	**12" Bench Top Planer**		398
36-220	10" Compound Mitre Saw	350	235
28-180	Bench Band Saw	232	145
28-190	NEW 12" Band Saw	465	375
40-640	20" Bench Scroll Saw	466	305
37-070	NEW 6" v/spd Bench Jointer	337	248
14-650	Hollow Chisel Mortiser	668	289
46-700	12" Wood Lathe	548	439
33-990	10" Radial Arm Saw	818	615
37-280	6" Motorized Jointer	488	395
37-154	DJ15 6" Jointer w/3/4HPmotor	1451	1089
50-179	3/4 HP 2 stage Dust Collector	483	335
70-200	20" Floor Drill Press	1049	615
33-055	8-1/4" Sawbuck comp w/legs	865	595
34-330	8-1/4" Table Saw 13A	343	234
32-100	Stationary Plate Jointer	645	249
36-040	8-1/4" Compound Mitre Saw	224	155
34-915	30" Unifence	385	239
34-897	50" Delta Unifence	525	285
36-755	10" Tilt Arbor Saw	1264	939
34-444	Contractors Table Saw	812	615
17-900	16-1/2" Floor Drill Press	462	389
40-601	18" Scroll Saw with stand	1003	745
22-661	13" Planer with 2HP motor	1513	1168
	Planer has **$75.00 rebate**-price is before rebate		
33-060	NEW "Sidekick" Miter Saw	510	365
14-070	NEW 14" Floor Drill Press	450	345
50-075	Dust Collector/Sweeper 3/4 HP	360	245

The following Delta tools have a $50.00 rebate! Price shown is before rebate. Exp. 3/31/94

28-283	14" Band Saw w/enc. stand	910	735
34-445	34-444 Saw w/30" Unifence	1200	775
34-445B	34-444 w/Bies. 50" saw fence	1300	889

MILWAUKEE TOOLS

6527	NEW Sawzall with case	320	164
6528	above Sawzall w/wired cord	316	164
6125	NEW 5"Random Orbit Sander	200	112
6126	NEW 6"Random Orbit Sander	205	115
0399-1	12V cordless Drill Kit comp	315	168
0402-1	**above Drill w/kyls chuck & 2 batt**		166
0395-1	9.6V cordless Drill with case	290	158
0224-1	3/8" Drill 4.5 amp magnum	227	114
0234-1	1/2" Drill 4.5A mag 0-850 rpm	237	119
0244-1	1/2" Drill 4.5A mag 0-600 rpm	237	123
0222-1	3/8" Drill 3.5 amp 0-1000 rpm	198	107
0228-1	3/8" Drill 3.5 amp 0-1000 rpm	195	104
0375-1	3/8" close quarter Drill	237	127
0379-1	1/2" close quarter Drill	268	145
6546-1	cdls Screwdvr 200 & 400 rpm	141	82
5399	1/2" D-hdle Hammer Drill Kit	332	188
6750-1	Drywall Gun 0-4000 5 amp	171	94
6507	Original SawZall with case	264	138
6010	Orbital Sander 1/2 sheet	214	118
8977	variable temp. Heat Gun	131	77
5397-1	3.8" var. spd Hammer Drill Kit	255	138
5371-1	1/2" var. spd Hammer Drill Kit	340	184
3107-1	1/2" v/spd right angle Drill Kit	399	204
6754-1	Drywall Gun 0-4000 5.4 amp	196	110
3300-1	1/2" var. spd right angle Drill	356	185
5680	Router 2 HP - 12 amp	362	198
0235-1	1/2" Drill w/keyless chuck	237	128
6145	4-1/2" Grinder 10,000 rpm	168	99
6142	6145 with case & accessories	208	124
6749-1	Drywall Gun 0-2500 5.4 amp	218	124
6365	7-1/4" Circular Saw 13 amp	218	122
6366	6365 w/fence & carbide blade	228	127
6368	6365 w/fnce,carb. blde,& cse	249	139
6377	7-1/4" Worm Drive Saw	330	184
6256	Top Handle Jig Saw	264	144
6490	10" Mitre Saw	444	248

FREUD CARBIDE TIPPED SAW BLADES
5/8" Bore - Industrial Grade

Item	Description	Teeth	List	Sale
LU72M010	Gen Pur. A.T.B.	10" 40	69	39
LU82M010	Cut-off 10"	60	93	49
LU84M011	Comb 10"	50	78	42
LU85M010	Super Cut-off	10" 80	115	59
LM72M010	Ripping 10"	24	69	38
LU73M010	Cut off 10"	60	84	45
LU87M010	Thin Kerf 10"	24	72	39
LU88M010	Thin Kerf 10"	60	88	45
LU98M010	Ultimate 10"	80	128	68
LU91M010	Compnd Mitre 10"	60	88	54
TK303	7-1/4" Finishing	40	38	22
TK306	10" Finishing	40	47	25
TK906	10" Combo	50	53	29
SD306	6" Dado - Carbide		215	112
SD308	8" Dado - Carbide		230	119
F0	1-3/4" x 5/8" Biscuit 1000 Qty		43	29
F10	2-1/8" x 3/4" Biscuit 1000 Qty		43	29
F20	2-3/4" x 1" Biscuit 1000 Qty		45	29
FA	Assorted Biscuits 1000 Qty		45	29
FB100	16 piece Forstner Bit Set		338	184
94-100	5 pc. Router Bit Door System		320	159
TR215	NEW 10" Slide Cmpd Mitre Saw		688	359
FT2000E	3-1/4 HP v/sp Plunge Router		410	205
JS100	Biscuit Jointer with case		334	162

MAKITA TOOLS

Model	Description	List	Sale
6070DW	3/8" v/spd Reverse Drill 7.2V	128	74
6071DWK	above Drill w/removable batt.	216	115
5090DW	3-3/8" Saw Kit 9.6 volt	270	139
6010SDW	3/8" cordless Drill Kit 7.2V	99	59
ML900	Incandescent Flashlight 9.6V	Sale	37
6012HDWE	2 speed Drill Kit w/2 batt.	243	129
6093DWE	6093DW Drill Kit w/2 batteries	270	145
6095DWE	**6095DW Drill Kit w/2 batteries**		139
6201DWE	NEW 9.6V Drill Kit w/2 batt.	298	155
6211DWE	12V Drill Kit with 2 batteries	330	166
632007-4	9.6 volt Battery	47	30
632002-4	7.2 volt Battery	39	28
5007NBA	7-1/4" Saw w/electric brake	263	127
5008NBA	8-1/4" Saw w/electric brake	346	188
B04510	1/4 sheet Pad Sander	106	59
9900B	3" x 21" Belt Sander w/bag	344	165
9924DB	3" x 24" Belt Sander w/bag	329	175
4301BV	Orb. var. spd Jig Saw 3.5A	292	165
JR3000V	var. speed Recip Saw w/case	252	135
LS1020	10" Mitre Saw 3.5 amp	630	339
9820-2	Blade Sharpener	394	195
N1900B	3-1/4" Planer with case	244	129
1911B	4-3/8" Planer 7.5 amp	309	175
9514B	4" Disc Grinder 4.6 amp	111	65
3601B	1-3/8 HP Router	288	158
B04550	1/4 sheet Pad Sander w/bag	98	49
DA3000R	3/8" Angle Drill	314	159
2708W	8-1/4" Table Saw	585	289
2711	10" Table Saw with brake	1067	525
6404	3/8" Drill Rev. 0-2100 rpm	112	58
6510LVR	3/8" Drill Rev. 0-1050 rpm	168	89
6820V	0-4000 rpm Drywall Gun	171	92
6013BR	1/2" Drill Rev. 6 amp	280	145
5402A	16" Circular Saw 12 amp	743	410
9401	4" x 24" Belt Sander w/bag	378	205
4302C	var. speed Orbital Jig Saw	351	194
5077B	7-1/4" Hypoid Saw	281	155
LS1030	NEW 10" Mitre Saw	428	199
5007NB	7-1/4" Circular Saw 13 amp	232	119
2012	12" Portable Planer	959	495
LS1011	10" Slide Compound Saw	946	498

SIOUX TOOLS

8030	New 3/8" var/spd Drill	250	139
8000	3/8" var/spd close qtr Drill	201	123
690	5" Air Random Orbit Sander	139	132
690VV	690 w/venturi dust collection	281	175

SENCO AIR NAILERS

SFN1	Finishing Nailer 1" - 2"	448	269
SFN2	Finish. Nailer 1-1/2" - 2-1/2"	571	375
SN325	Nailer 1-7/8" - 3-1/4"	665	425
SLP20	New Pinner w/cse 5/8 -1-5/8"	399	269
SKS	Stapler 5/8" - 1-1/2"	390	245
SN70	NEW HD Framer 2" - 3-1/2"	690	475

BOSTITCH AIR NAILERS

N80S-1	Stick Nailer Super Sale		348
N12B-1	Coil Roofing Nailer	845	395
N60FN-2	Finishing Nailer	650	335
T31	Brad Nailer	281	145
CWC100	1 HP Pancake Compressor	463	289

EXCALIBUR Fences & Tables

TT45R24L9	24" Fence	369	299
TT45R50L12	50" Fence	399	318
EXSLT30	Sliding Table	599	475
EXSLT60	Sliding Table	745	585

SKIL SIZZLERS

77	7-1/4" Worm Drive Saw	257	144
2735-04	12 volt cordless Drill Kit	249	132
2736-04	2735-04 with keyless chuck	269	135
1605-02	Biscuit Jointer w/case	221	129
3400	10" Table Saw - Bench Top	270	179

PANASONIC CORDLESS

EY6205BC	Variable speed 12 volt Drill with 15 minute charger & case	353	179
EY6205EQK	Same as EY6205BC but comes with **Ironman** battery	368	189
EY6207BC	NEW 12 volt 1/2" Drill w/keyless chuck var. speed w/15 min. charger & case	420	222
EY6282EQK	Var. spd 9.6 volt Drill with 15 min. charger, case & NEW **Ironman** battery	315	168
EY62821DKW	9.6 volt Drill Kit w/2 batt.	395	158

NEW PREDATOR DRILLS

EY6181CRKW	NEW 9.6V Compact Drill Kit w/2 batt - 10% more pwr than EY62821DKW	305	164
EY6100CRKW	NEW 12 volt Drill Kit with 2 batteries, 1 hour charger, & case	358	189
EY6100EQK	NEW 12 volt Drill kit with NEW **Ironman** battery, 15 min. charger, & case	375	199

PASLODE IMPULSE GUNS

IM250	Trimpulse Finish Nailer Kit	849	595
IM325	Impulse Framing Nailer Kit	849	595

WAGNER PAINT & SPRAYER PRODUCTS

120	Power Sprayer	70	57
230HD	Power Painter/Sprayer	100	84
255	Airless Kit	180	130
375E	Airless System	195	155
404	Airless Painter & Roller	320	249
505	High performance Airless Painter	440	369
550	Pro Airless Painting System	769	685
HVLP	Fine coat finishing HVLP System	195	155
CS2000	Pro fine finish HVLP System	339	269

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10" - 40 carbide teeth
List 95 Sale 49

F810
10" - 80 carbide teeth
List 135 Sale 74

New Super Dados
SD506
6" carbide w/case & shims
List 292 Sale 148

SD508
8" carbide w/case & shims
List 344 Sale 168

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DEWALT TOOLS

DW364	7-1/4" Circ. Saw w/brake 13 A	285	148
DW945K-2	3/8"12V cdls Drill Kit w/2 batt	309	169
DW944K-2	3/8"9.6V cdls Drill Kit w/2 batt	263	149
DW610	1-1/2 HP 2 handle Router	274	148
DW411	1/4 sheet Palm Sander. 1.7 amp.	97	58
DW100	3/8" Drill, 4 amp,0-2500 rpm,rev.	118	68
DW510K	1/2" v/spd Hammer Drill w/case	311	165
DW682K	NEW Biscuit Joiner with case	429	225
DW705	12" Compound Mitre Saw	706	358
DW615	NEW 1-1/4 HP Elec. Plge Router	290	158
DW625	**NEW 3 HP var. spd Plunge Router**	269	159
DW675K	NEW 3-1/8" Planer with case	289	159
DW431	NEW 3 x 21 v/spd Belt Sander	331	182

PORTA NAILER

401	Porta Nailer complete	265	205
501	Face Nailer complete	265	205

WERNER LADDERS

6204	4' Fiberglass	179	65
6205	5' Fiberglass	199	75
6206	6' Fiberglass	225	82

HITACHI TOOLS

F1000A	12" Planer/6" Jointer	2970	1549
P12R	12-9/32" Planer	1470	759
P12RA	Planer/Joiner	1940	979
C8FB	8-1/2" Slide Compound Saw	1400	599
G12SA	4-1/2" Grinder 6.9 amp	160	89
DS10DVAK	NEW 12V Cordless Drill Kit	393	199
NR83A	Framing Nailer 2 - 3-1/2 Full Head	700	385
NR83AA	Framing Nailer 2 - 3-1/2 Clip Head	750	409
NT65A	16 ga. Brad Nailer 1 - 2-1/2	610	318
NV45AB	Coil Roofing Nailer 7/8 - 1-3/4	750	395
NV83A	Coil Nailer 2 - 3-1/4	750	409

BIESEMEYER FENCES

B-50	50" Commer. Saw Fence	345	298
T-SQUARE 52	52" Homeshop Fence	279	238
T-SQUARE 40	40" Homeshop Fence	259	208
T-SQUARE 2828	28" Homeshop Fence	249	198

WEDGE SMART LEVEL

SM-PR2	2 FT Level with sensor	120	88
SM-PR4	4 FT Level with sensor	150	105
SM-PR6	78" Level with sensor	180	139
SL224	NEW 2FT Level with sensor	79	55

Msx636 FEIN	Triangle Sander Kit	Sale	195
LPN672 PONY	Air Palm Nailer w/glove	Sale	94.99

JORGENSEN ADJUSTABLE HANDSCREWS

Item#	Jaw Length	Open Cap	List	Sale	Box of 6
#0	8"	4-1/2"	19.76	11.75	58.00
#1	10"	6"	22.63	12.50	68.00
#2	12"	8-1/2"	25.95	14.50	78.00
#3	14"	10"	32.88	18.00	99.00
#4	16"	12"	42.76	23.95	139.00

JORGENSEN STYLE 37 2-1/2"Throat 1/4"x3/4"

Item#	Jaw Length	List	Sale	Box of 6
3706	6"	10.67	6.05	32.50
3712	12"	11.82	6.50	35.10
3718	18"	13.04	6.99	37.75
3724	24"	14.25	7.99	42.50
3730	30"	15.88	8.85	47.75
3736	36"	17.36	9.99	53.95

PONY CLAMP FIXTURES

Model		List	Sale	Lots of 12
50	3/4" Black Pipe Clamps	14.87	7.75	83.99
52	1/2" Black Pipe Clamps	12.40	6.40	68.50

BOSCH

1587VS	NEW Top Hand "CLIC" Jig Saw	292	165
1584VS	NEW Barrell"CLIC"Jig Saw	285	159
Bosch Metal Case for above Jig Saws		34	32
Bosch 30 blade assortment for Jig Saws		55	27.99
1942	Heat Gun 600° - 900°	125	78
1272D	3" x 24" Belt Sander with bag	375	185
1273D	4" x 24" Belt Sander with bag	380	195
11-212VSR	Bulldog 3/4"SDS Rtry Drill	390	198
1347AK	4-1/2" Grinder w/cs & access.	185	104
1348AE	5" Grinder 8.5 amp	225	118
1194VSR	1/2" var. speed Hammer Drill	282	145
1194VSRK	above Hammer Drill w/case	313	169
1608	5.6 amp Laminate Trimmer	168	88
1609K	Lam Installers Kit with 1609	343	175
1609KX	Deluxe Installers kit	405	198
1604A	1-3/4 HP 2 Handle Router	250	134
1604AK	same as above w/cse & acc.	318	169
1606A	1-3/4 HP D-handle Router	295	168
3258	3-1/4" Planer w/blade guard	247	138
3258K	3258 Planer with steel case	273	154
3270DVS	3 x 21v/spd belt sander w/ bag	270	159
1273DVS	var. spd 4" x 24" Belt Sander	415	204
1614	NEW 1HP Plunge Router	245	128
1614EVS	NEW 1-1/4HP v/spd Plge Rtr.	283	149
1613	NEW 1-3/4 HP Plunge Router	316	164
1613EVS	**NEW 2HP v/sp Plunge Router**	183	
1615	NEW 3 HP, Plunge Router	430	228
1615EVS	NEW 3 HP w/spd Plge Router	505	244
1632VSRK	Recip Saw 8.4A orb-v/spd	225	148
3050VSRK	9.6V cdls v/sp Drill Kit comp	288	138
3051VSRK	3050VSRK w/keyless chuck	299	145
1370DEVS	6" Random Orbit Sander	427	219
3283DVS	5" Random Orbit Sander	169	98
3283DVSK	3283DVS Kit complete	199	118

ELU BY BLACK & DECKER

Model	Description	List	Sale
3338	2-1/4 HP v/spd Plunge Router	501	249
3375	3-1/8" Univ. planer 7.2 amp	329	155
3380	Biscuit jointer with case	569	185
3339	NEW 3 HP v/sp Plunge Router	511	265

BLACK & DECKER

1166	3/8" Drill 0-2500 rpm 4 amp	118	65
1703-1	10" Mitre Saw w/73-770 blde.	344	185
79-034	Workmate 400	181	109
2694	7-1/4" Super Sawcat w/case	265	152
2695	8-1/4" Super Sawscat w/case	328	162

DAVID WHITE

LP6-20	Sight Level package - 20x	310	198
LP6-20XL	LP6-20 w/9056 tripod & 7620 rod	259	
L6-20	Meridian Level - 20x	290	185
LT8-300	Level Transit - 26x	695	445
LT8-300P	above Level w/optical plum	821	518
LT6-900	Level Transit - 20x	389	249
ALT6-900	Automatic Level - Transit -18x	638	389
ALTP6-900	above Level w/tripod & rod	708	459
ALP6-18HD	above Level w/tripod & rod	570	375

RYOBI SPECIALS

JP-155	6-1/8" Jointer/Planer	700	305
TS-254	10" Mitre Saw	440	198
RE600	3 HP Plunge Router	500	215
BE321	3" x 21" var. spd Belt Sander	310	135
TFD222VRK	12V cordless Drill Kit	365	172
JM100K	Biscuit Jointer w/case	475	215
BT3000	10" Table Saw with stand	1125	529
TSS220	8-1/2" Slide Comp. Saw	966	435
DS1000	NEW Detail Sander	90	44
AP12	NEW 12" Bench Planer	884	399
RA202	NEW 8-1/4" Bench Radial Saw	800	389
BS900	NEW 9" Bench Band Saw	340	174
IDV26	NEW 28 Gal. Industrial Dry Vac	225	119
OSS450	NEW Oscilating Spindle Sander	340	174

LAMELLO BISCUIT JOINTERS

TOP 10	"Simply the Best"	699	538
STANDARD 10	"Professionals Choice"	499	399

QUAL-CRAFT PRODUCTS

2200	Pump Jack	79	58
2201	Pump Jack Brace	30	20
2203	Pump Jack guard rail holder	31	21
2204	Workbench & rail holder combo	53	39
	Buy any 6 (can be assort.) deduct 10%		
2601	Wall Jack	167	108
	Lots of 4 deduct additional 10%		

PORTER CABLE

690	1-1/2 HP Router 8 amp	260	138
9690	690 Router with steel case	305	145
691	1-1/2 HP Router D-handle	285	152
695	1-1/2 HP Router/Shaper	400	218
696	HD Shaper Table	230	129
351	3" x 21" Belt Sander w/o bag	280	148
352	3" x 21" Belt Sander with bag	290	154
360	3" x 24" Belt Sander with bag	365	194
361	3" x 24" Belt Sander w/o bag	345	184
362	4" x 24" Belt Sander with bag	380	198
363	4" x 24" Belt Sander w/o bag	360	195
315-1	7-1/4" Top Hdle Circular Saw	225	118
9315-1	315-1 comp. w/cs & carb bld	255	139
617	7-1/4" Pushhandle Saw	220	124
9617	617 comp. w/cse & carb blde.	250	142
97751	1/2" v/spd Hammer Drill w/cse	270	155
9118	Porta Plane Kit 7 amp	390	209
505	1/2 sheet Pad Sander	230	124
6611	3/8" var. speed Drill 5.2 amp	220	118
6614	1/2" var. speed Drill 0-750 rpm	230	124
6615	7514 with keyless chuck	230	124
7549	Top handle Jig Saw 4.8 amp	270	145
330	Speed Block Sander 1/4 sheet	110	60
555	Plate Biscuit Jointer with case.	320	168
556	**555 jointer w/5556 tilt fence**		179
345	6" Saw Boss 9 amp	190	104
9345	345 comp. w/cse & carb blde.	220	124
9647	TIGER CUB Recip. Saw	210	117
9637	Full var/spd Recip Saw 8 amp	270	148
7519	3-1/4 HP Router 2 Handle	445	234
7518	3-1/4 HP 5 speed Router	510	268
7538	3-1/4 HP Plunge Router	445	234
7399	5.6 amp Drywall Cutout Unit	140	84
7310	5.6 amp Laminate Trimmer	165	92
97310	Laminate Trimmer Kit comp	360	195
7334	5" Random Orbit Sander	225	122
7335	5" var. spd Rndm Orbit Sndr	245	132
7336	6" var. spd Rndm Orbit Sndr	250	137
73333	Dust Collection system	31	24.50
693	1-1/2 HP Plunge Router Base	320	172
6931	Plunge Router Base	125	77
7539	3-1/4HP v/spd Plunge Router	510	264
9852	12V 3/8"Drill w/cse 0-1000rpm	280	149
9853	9852 with keyless chuck	280	154
9855	12V 1/2" 2 spd,v/sp Drill w/cs.	335	184
8500	12V battery for above drills	Sale	45
	New Tools by Porter Cable		
9841	9.6V Drill Kit-15 min. charger	309	172
9840	9.6V Drill Kit with 2 batteries	289	164
332	Palm Grip Rndm Orbit Sander	120	69
333	above Sander with dust bag	135	74
334	333 Sander with PSA pad	135	74
352VS	3x21 Belt Sander w/bag v/spd	305	165
7116	24" Omni Jig	535	294
550	Pocket cutter with case	330	179
310	Production Laminate Trimmer	250	145
7700	10" "Lazerloc" Mitre Saw	634	339
347	7-1/4" "Framers" Circ Saw	225	129
447	347 Saw with brake	245	139

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FINISHING TOUCHES

WOODWORKER ON A MISSION

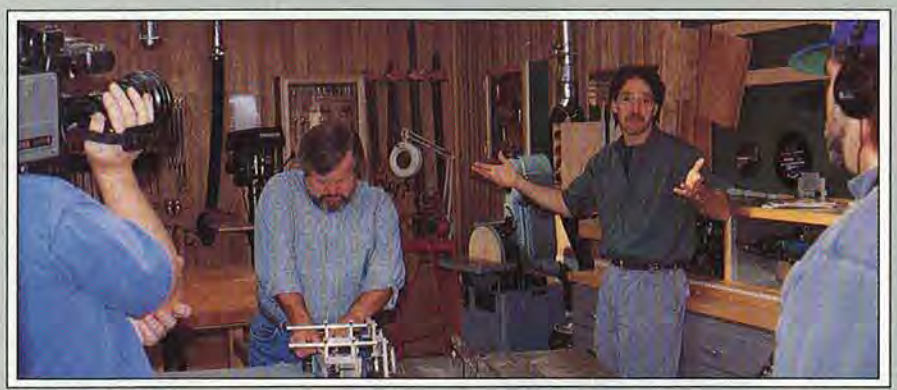
At *WOOD*® magazine, readers write to us from all around the globe. In the past, we've corresponded with woodworkers in Australia, South Africa, Japan, and Europe. And recently, we received a letter from Kevin Brown, a missionary in Bolivia, that really grabbed our interest.

He wrote to request copies of articles that he saw referred to in an issue of *WOOD*. He found the magazine in a book display during market day in Cochabamba, the town where he's stationed. Of course, we obliged Kevin, because woodworking publications in his part of the world are next to nonexistent. In his letter, he also mentioned the difficulty in subscribing to any English-language magazine; it seems that copies get stolen before delivery. That's particularly sad because Kevin has a group of neighborhood boys that he wants to teach woodworking to. Although Kevin didn't specifically ask for help, why not give him some?

If you have any woodworking periodicals or books you can spare, please send them to Kevin. Here's his address (and according to him, first class gets through best):

Kevin R. Brown, Cajon 3279, Cochabamba, Bolivia, South America.

TV WOODWORKER VISITS THE IDEA SHOP™



On location in the IDEA SHOP, design editor Jim Downing adjusts the tablesaw fence while Scott Phillips comments to his future televison audience.

Scott Phillips, star of "The American Woodshop" on PBS television, prowls the nation for program material. Early last November, his search brought him to Des Moines, Iowa, and *WOOD* magazine's IDEA SHOP.

Accompanied by technicians Sam Roberts and Mark Morgan, the entertaining and inquisitive television woodworker received an in-depth shop tour by Design Editor Jim Downing. During his day-long visit, Scott learned about shop planning, discussed tool selection, and thoroughly examined all the storage and workspace innovations he found.

Scott traces his woodworking back to his childhood, and he tells viewers how to complete different projects on each show. To discover what he found out at the IDEA SHOP, tune to your local PBS station this month (April) to catch the program.

Furniture for the homeless, by Black & Decker

NBA great Walt Frazier, *right*, gets an assist from Black & Decker president Gary DiCamillo in putting the finishing touches on a dining table during the New York build-a-thon.

About this time last year, tool manufacturer Black & Decker was laying plans for a first-ever build-a-thon in conjunction with its introduction of a new line of power tools. The purpose was to provide furniture for homeless shelters in New York City, built by company volunteers, media personnel, members of New York's chapter of Habitat for Humanity, and at least one sports great (see photo *above*).

In late June, the woodworking team spent 24 straight hours building 114 tables, 222 benches, and 37 storage units. Black & Decker donated power tools from their new Quantum line for the task, and the furniture was delivered by members of the New York Army National Guard. Said Gary DiCamillo, president, Black & Decker North America and build-a-thon participant, "By putting our tools to work for this cause, we are hopeful that we will help improve the plight of the homeless."

Outdoor projects, yes!

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Photographs: Black & Decker; Peter J. Stephano Illustrations: Jim Stevenson

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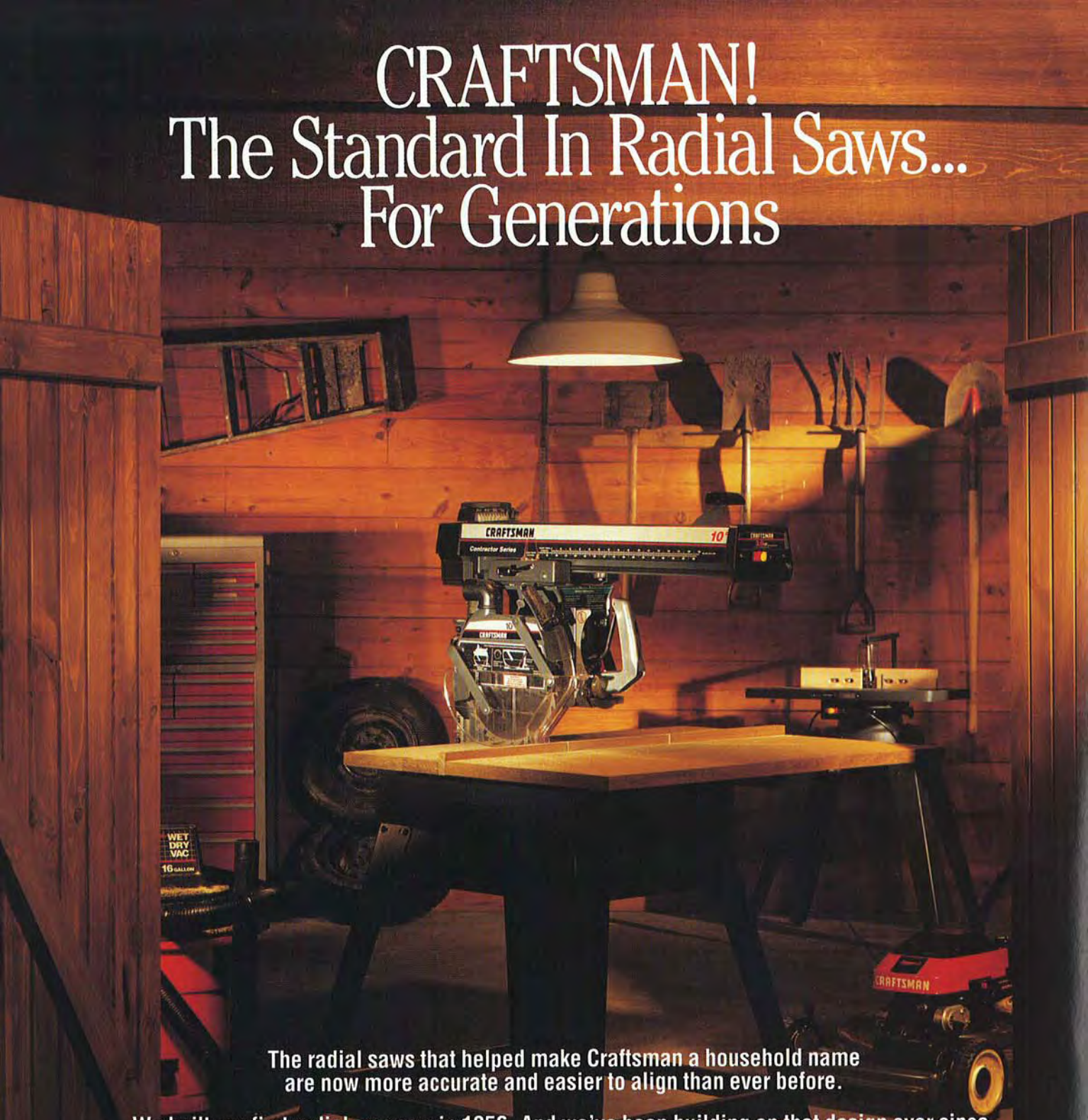

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